THE FEASIBLITY OF THE OVER-THE-HORIZON AMPHIBIOUS ASSAULT FOR U.S. NAVY AND MARINE CORPS FORCES

A thesis presented to the Faculty of the U.S. Army Command and General Staff Colege in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

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B.S., U.S. Naval Academy, Annapolis, Maryland, 1982

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An analysis of the doctrine, equipment, and technology contributing to the feasibility of the over-the-horizon amphibious assault.

This study is an analysis of the tactics, techniques, procedures, doctrine, equipment, and technology utilized in over-the-horizon amphibious assaults. The study examines the issues surrounding current feasibility of the assault, as well as future feasibiilty of the assault. The study also briefly examines alternatives to over-the-horizon assault.

The study concludes that over-the-horizon amphibious assault is not only feasible, but a required capability for the future. Current procedural and equipment deficiencies preclude feasibility for the moment, but given sufficient time and money, these difficulties can be overcome, ensuring over-the-horizon amphibious assault mission accomplishment.

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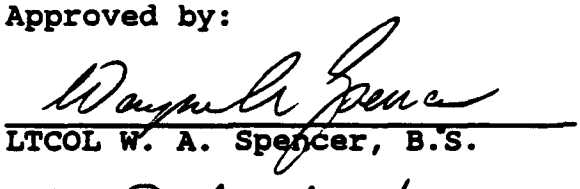

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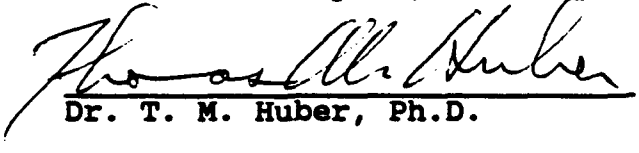

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE FEASIBILITY OF THE OVER-THE-HORIZON AMPHIBIOUS ASSAULT FOR U.S. NAVY AND MARINE CORPS FORCES:
An analysis of the doctrine, equipment, and technology contributing to the feasibility of the over-the-horizon amphibious assault. By Lieutenant Commander Stephen L. Goertzen, USN, 128 pages.

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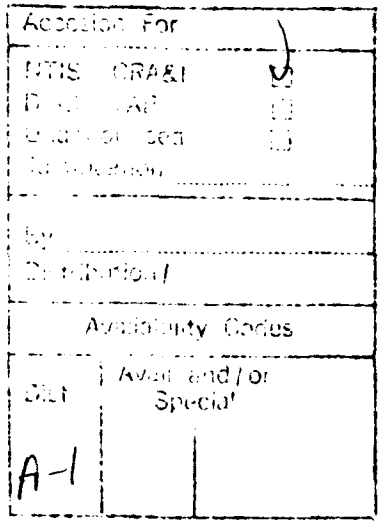

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AAAV - Advanced Amphibious Assault Vehicle

AAV - Amphibious Assault Vehicle

AOA - Amphibious Operating Area

ARG - Amphibious Ready Group

ATF - Amphibious Task Force

BLT - Battalion Landing Team

CNA - Center for Naval Analyses

DON - Department of the Navy

FPV - Force Projection Vehicle

FSA - Fire Support Area

GPS - Global Positioning System

HF - High Frequency

LCAC - Landing Craft, Air Cushion

LCC - Amphibious Command & Control Ship

LCM-8 - Landing Craft, Mechanized Version 8

LCS - LCAC Control Ship

LCU - Landing Craft, Utility

LHA - Amphibious Assault Ship, general purpose

LHD - Amphibious Assault Ship, general purpose

LOD - Line Of Departure

LPD - Landing Ship, Personnel, Dock

LPH - Amphibious Assault Ship, helicopter

LSD - Landing Ship, Dock

LST - Landing Ship, Tank

LX - Experimental Amphibious Assault Ship

MAGTF - Marine Air Ground Task Force

MEB - Marine Expeditionary Brigade

MEF - Marine Expeditionary Force

MEU - Marine Expeditionary Unit

MLRS - Multiple Launched Rocket System

NM - Nautical Mile

NGFS - Naval GunFire Support

NWP - Naval Warfare Publication

OTH - Over-The-Horizon

PCS - Primary Control Ship

RLT - Regimental Landing Team

RPV - Remotely Piloted Vehicle

SBACS - Shore Bombardment Air Cushion System

SCS - Secondary Control Ship

SDV - Swimmer Delivery Vehicle

SEA - Sea Echelon Area

SEAL - Sea, Air, and Land Commando

SINCGARS - Single Channel Ground and Airborne Radio System

UHF - Ultra High Frequency

USMC - United States Marine Corps

USN - United States Navy

VHF - Very High Frequency

V/STOL - Vertical/Short Take Off and Landing

CHAPTER ONE

INTRODUCTION

Amphibious operations have existed for hundreds of years. One of the earliest recorded instances of an amphibious operation was in 490 B.C. when a force of Persians invaded Greece.[1] In approximately 50 B.C., Caesar crossed the Adriatic Sea in an amphibious operation against the lands of Pompey.[2] The Vikings also performed amphibious operations, and in the year 793, conducted an amphibious assault against the island of Lindisfarne.[3] During the Civil War in the United States, the Union forces conducted amphibious operations in the Battle for Vicksburg.[4]

Despite the conduct of amphibious operations in the Civil War, U.S. doctrine for amphibious assault did not officially exist until 1934.[5] This doctrine was the basis for many successful amphibious assaults conducted during World War II. The United States relied upon the amphibious assault in the "island hopping" campaign (1943-1945) in the Pacific Ocean.[6] (See Figure 1, Appendix B.) While successful, each assault was costly in terms of casualties.[7] The islands of Attu, Betio, Abemama, Makin, Tarawa, Kwajalein, Saipan, Roi, Namur, Engebi, Eniwetok, Okinawa,

and Iwo Jima were assaulted amphibiously at the cost of 9,879 U.S. killed and wounded.[8] On June 6, 1944, the United States and her allies invaded the continent of Europe in the largest amphibious assault to date.[9] Assault forces traveled through waters that contained mines[10] and had large numbers of underwater obstacles designed to sink the landing craft.[11] The Allied forces suffered between ten thousand and twelve thousand casualties from mines, underwater obstacles, and fire from the beach.[12] This caused our military leaders, such as the Chairman of the Joint Chiefs of Staff, General Omar Bradley, to testify before the House Armed Services Committee that "large-scale amphibious operations . . . will never occur again."[13] Two years later, the United States conducted an amphibious assault at Inchon, Korea, which created a dramatic transition from defense to offense for the U.S., changing the whole course of the war.[14] This amphibious assault stopped the North Korean offensive, relieved the beleaguered U.S. troops who were in a final defense, and breathed hope into the possibility of preserving South Korea.[15]

Significance

In 1991, during Operation Desert Storm, two Marine Expeditionary Brigades threatened to conduct an amphibious assault using the current doctrine against the Iraqi forces in Kuwait.[16] The Iraqis had expended many resources

installing underwater and beach obstacles. They had mined the offshore waters, and had committed thousands of troops to the defense of the beach.[17] Because of this, General Schwarzkopf, the commander-in-chief of the coalition forces, decided that an amphibious assault would incur too many casualties.[18] Although he did not execute the amphibious assault, it did cause the commitment of enemy forces away from the coalition main effort.

Amphibious assault has been a useful military tool for hundreds of years, not only in U.S. history, but throughout many other countries as well. Clearly amphibious assaults as currently conducted can be *extremely costly in terms of lives and equipment*.

The United States has entered a time where the new advanced technology available to all countries is threatening current U.S. military doctrine. The use of mines, underwater obstacles, and particularly modern weaponry has made the conventional amphibious assault a potential killing zone for ships, landing craft, and troops. Current conventional amphibious doctrine creates a prohibitive situation, possibly setting the stage for military disaster. Doctrine must be changed to make amphibious operations more equitable. The choices that result are three: (1) continue conducting amphibious assaults as the United States has in the past, (2) cease conducting amphibious assaults entirely, or (3) change the

method of conducting assaults to a less costly way. Over-the-horizon amphibious assault is one possible, less costly solution.

The purpose of this thesis is to identify the feasibility of over-the-horizon amphibious assault, changing the method of conducting assaults in an attempt to reduce the number of lost lives and equipment. Discussion through the course of this thesis will consist of the current method of conducting assaults for comparison purposes, and determine that the over-the-horizon (OTH), is feasible. Discussion will focus on the U.S. Navy and Marine Corps forces. The U.S. Army also has the mission of amphibious assault, but because it is not their primary mission, they will not be examined.

Chapter One of this thesis will discuss the background, origins, and conduct of the current method of amphibious assault. It will discuss the direction the U.S. Navy and Marine Corps are moving to reduce the number of lost lives and equipment. This chapter gives some basic definitions required for understanding this topic. The advantages and disadvantages of the conventional amphibious assault are the final points in the chapter.

Chapter Two will examine the literature available for study on amphibious operations, some delimitations on the literature available for review, and some assessment on

the usefulness of the literature. Methodology for researching this topic is also in Chapter Two.

Chapter Three will focus on feasibility issues, advantages and disadvantages, and provide a look into the future. The discussion in Chapter Four will focus on study results, and provide some areas for future study.

Background

Current doctrine for amphibious assault is partially based on the study of the British invasion at Gallipoli in 1915, during World War I. The United States Marine Corps (USMC) decided that the British amphibious assault at Gallipoli failed because of faulty doctrine, ineffective techniques, poor leadership, and a lack of cooperation between the services.[19] The Corps resolved not to repeat these mistakes and to develop a better working doctrine for amphibious warfare.

In the early 1920s, Major Earl H. Ellis, a contingency planner for the USMC, began work on a scenario where Japan had declared war and conquered many of the Pacific islands. He developed an outline plan of "island-hopping" in the Pacific, with emphasis on the Marine Corps role of offensive amphibious assault.[20]

Major Ellis developed his thoughts on amphibious assault to support his plan of "island-hopping." He realized that any assault against most of these small

islands would have to be done amphibiously, and probably against a significant defense. Major Ellis then spent long hours examining the invasion of Gallipoli, applying the lessons learned, developing tactics, techniques, and procedures for the conduct of an amphibious assault and developed the basis for amphibious assault doctrine.[21]

In 1933, the Marine Corps school in Quantico, Virginia, was assigned to develop and implement amphibious assault doctrine. Classes were discontinued while the students and staff began to assemble a manual for landing operations. Ideas were taken from Major Ellis' notes (who had passed away in 1923), after action reports and lessons learned from previous attempts at amphibious assaults, and individual and group thought.[22]

The result of this effort was the Tentative Manual for Landing Operations, the doctrine for conventional amphibious assault, published in 1934. [23] This doctrine was used throughout World War II with minor revisions. It also went through two minor changes, in the late 1950s and 1962, but it essentially remained the 1934 doctrine.[24]

The Need for Change

Many reasons exist for the change from the conventional amphibious assault. The vulnerability of the amphibious ships to modern weapons, mines, and the change

from attrition to maneuver warfare have forced the U.S. to question its amphibious warfare doctrine.

Modern Weapons

As noted, the 1962 doctrine for amphibious operations was not too different from the 1934 doctrine.[25] Current conventional amphibious assault (an assault conducted according to the 1962 doctrine) still requires amphibious ships to get as close as four thousand yards from the beach.[26] This exposes the ships, landing craft, and helicopters to hostile fire from the beach.[27] It also makes ships extremely vulnerable to mines and could possibly delay the landing or damage ships.[28] Technology and arms proliferation have also brought many dangers to amphibious operations.

> It is quite likely that near future amphibious assaults, even in third world areas, will be confronted with the widespread usage of missiles. The mobility of launch platforms, including the use of trucks for Exocet missiles, makes the selection of the least defended areas much more difficult.[29]

Anti-ship cruise missiles[30] and precision-guided munitions traveling at high speed pose a serious threat to shipping, even in areas that are not well defended.[31] These missiles come in from over the land and usually cannot be detected until they are over the water, which allows only a few seconds for reaction.[32]

> The advent of "smart" weapons, "real-time" intelligence gathering, . . ., the proliferation of cruise missiles among forty nations, increasing availability of satellite imagery, the resurgence of the use of mines, and the potential for high numbers of casualties have caused some observers to question again the feasibility of amphibious assault.[33]

These technology advances prove that the current method of conducting an amphibious assault would result in *many* casualties, both personnel and equipment, and perhaps a total failure of the landing, a valid reason for not conducting a conventional amphibious assault.

Mines

The conventional amphibious assault is also vulnerable in another area, one of low technology, specifically mines. The presence of a minefield, or even the perceived existence of a minefield, can alter naval operations. Mines are cheap, long-lived weapons that are favorites of third world countries.[34] Most mines are laid off coastal waters, posing a danger to any ships or craft coming in close to the beach. An integrated mine defense can cripple the ability to conduct a successful landing, and can cause many casualties.[35]

Maneuver Warfare

Another potential reason for not conducting conventional amphibious assaults is the change from

attrition warfare to maneuver warfare, as discussed in FMFM-1, the Marine Corps manual of warfighting.[36] Reduction of casualties and support of the concept of the nonlinear battlefield is the goal of this change.[37] In attrition warfare, "massive numbers of casualties were expected and generally incurred."[38] The U.S. Marine Corps states:

> Warfare by attrition seeks victory through the cumulative destruction of the enemy's material assets by superior firepower and technology . . . results are generally proportionate to efforts; greater expenditures net greater results-that is greater attrition. The greatest necessity for success is numerical superiority. Victory does not depend so much on military competence as on sheer superiority of numbers in men and equipment.[39]

The U.S. Marine Corps should not conduct an amphibious assault on obvious terrain, and advance in wave formation, but instead attack on the flanks, avoid the enemy's strongest defenses and disrupt enemy cohesion.[40] From the flanks, combat troops attempt to encircle the enemy, forcing the enemy to either retreat or risk being surrounded and taken as prisoners. In either case, the use of maneuver warfare will allow the main landing beach to be made available to land additional troops and equipment.[41]

The Over-the-Horizon Assault

The U.S. Navy and Marine Corps have recognized that the problems of modern weapon proliferation, vulnerability to mines, and the development of maneuver warfare make a

conventional amphibious assault less desirable, even obsolete.[42] The solution the U.S. has chosen is to improve its abilities to outmaneuver the enemy and increase its ability to build up combat power ashore from the beach before the enemy can react.[43] To counter these problems, the U.S. has developed a technique called the over-the-horizon amphibious assault.[44] This concept (doctrine for an OTH assault has not been written yet) is a modification of a conventional assault.[45] The over-the-horizon assault is conducted in much the same fashion as the conventional assault, except for a few procedural and equipment differences. The major difference is that the amphibious ships operate at a distance of twelve to one hundred miles from the beach, instead of four to ten miles in the conventional assault.[46]

Moving the amphibious ships out over the horizon will expose only the landing craft and helicopters to direct fire from the beach. The ships, while still vulnerable to anti-ship cruise missiles and perhaps larger artillery, are generally safe from the more conventional fire from the beach.

Moving the ships out to these distances also reduces the likelihood of being struck by mines.[47] It gives more reaction time to avoid incoming anti-ship cruise missiles and precision-guided missiles, possibly saving both ships and lives.[48]

While increasing the distance from the beach sounds like the ideal solution, other problems develop, which begs the question, "Is the over-the-horizon amphibious assault feasible for U.S. Navy and Marine Corps forces?" An examination of this question in three parts is in order: (1) Is the over-the-horizon assault feasible today, (2) Is it feasible in the near future, and (3) are there other means available that can accomplish the mission better?

Before attempting to answer these questions, some assumptions must be made, basic terms must be defined, and the procedures for conducting an assault must be understood.

Assumptions

Three key assumptions by the author are critical to this thesis: the retention of the forcible entry capability, the retention of the amphibious assault as a method of conducting forcible entry, and that the over-the-horizon assault will be the method of amphibious assault forcible entry.

Retention of Forcible Entry

The first assumption concerns *forcible entry*, or the establishment of a military presence in an area defended by an enemy with direct fire weapons.[49] Since the Brookings Institution in 1976 predicted the demise of amphibious operations because of modern weaponry, there has been

disagreement whether a forcible entry capability is a requirement for U.S. forces.[50] Arguments against the retention of forcible entry include the casualties that could result from an assault, and the doctrinal requirements that must be met prior to the assault.

Casualties in an Amphibious Assault

The casualties in any future amphibious assault are expected to be high, many due to arms proliferation:

> Record arms sales have ensured that even the smallest third-world countries possess the wherewithal to engage amphibious forces before and after the landing, thus making any opposed operation a risky venture.[51]

What this means is that any type of amphibious assault, conducted anywhere in the world will meet resistance so great as to question the utility and cost of forcible entry.

Doctrinal Requirements

The requirements of amphibious doctrine also contribute to the argument against forcible entry. Doctrine requires air, naval, and ground superiority.

> Given the proliferation of modern weaponry and the potential areas where such landings may be conducted, achieving such superiority may well prove impossible. Even if such local superiority is attainable, a few modern weapons could dramatically alter the battlefield equation. The near-disaster at Port Fitzroy in the Falklands Conflict demonstrated this point. The traditional air and naval bombardment followed by an overwhelming assault by ground troops could be gone forever.[52]

The inability to meet the doctrinal requirements of air, naval, and ground superiority may suggest that forcible entry is no longer even feasible, much less a requirement. Additionally, within the Marine Corps itself, researchers, developers, budget personnel, and military personnel disagree over the need and form of forcible entry.[53] In 1984, while giving testimony to Congress, Major General Glasgow, USMC, said that the Marine Corps would never assault a hostile beach.[54] However, most military observers agree that we can't afford *not* to have the forcible entry capability.[55]

In spite of the potential costs involved with forcible entry, there are many arguments for the retention of the forcible entry capability. Some of the arguments include national security requirements, the deception aspect, geographical requirements, and the physical combat capability of the assault forces.

National Security

Political leaders and highly placed members of government recognize that the possession of the forcible entry capability is a necessity, even if the capability is not used. Richard Cheney, the Secretary of Defense said in 1990:

> With a shrinking overseas base network and fewer nations willing to allow U.S. access to their facilities . . . the capabilities of

> our maritime power projection (amphibious operations) have become even more vital to our security.[56]

So the executive branch, in accordance with the National Military Strategy of the U.S. government, requires forcible entry in the interests of national security.

Deception

The deception capability is another reason for the retention of forcible entry. B.H. Liddell Hart, the British historian stated:

> The history of warfare shows that the basic strategic asset of sea-based peoples is amphibious flexibility. In tackling land-based opponents, they can produce a distraction to the enemy's power of concentration that is advantageously disproportionate to the scale of force they employ and the resources they possess.[57]

Though other examples exist, perhaps the deception capability was best seen during Operation Desert Storm. During the Gulf War, the United States operated an amphibious task force (ATF) in the Persian Gulf, with two full Marine Expeditionary Brigades (MEBs), consisting of approximately 32,000 troops. Their presence forced the Iraqis to maintain seven divisions (approximately 80,000 troops) in defensive positions along the coast, preparing for the amphibious assault that never came. This contributed to the success of Operation Desert Storm in that it diverted resources, materials, combat and support forces

away from the thrust of the coalition troops, making the land portion of the battle less costly.[58]

Another aspect of deception is the amphibious demonstration or feint. On 25 February 1991, during Operation Desert Storm, marine helicopter squadrons conducted a feint on the Kuwait coast, and as a result, the Iraqis fired several Silkworm missiles and sent reinforcements to deal with the threat. This diversion of Iraqi resources resulted from the Iraqi belief in the U.S. forcible entry capability.[59]

Geography

Geography can also require the capability of forced entry. In certain geographical situations, an opposed assault may be the only solution. In World War II, for example, most of the islands assaulted were so tiny and so well defended that there was no chance of coming ashore unopposed.[60]

Physical Combat Requirements

The Naval Intelligence Support Center, an organization that studies threats to the United States and her interests, did an analysis on threats during the years 2000 to 2020. The analysis showed that the threat (Soviet Union and Third World countries) would still require us to maintain the forcible entry capability.[61]

Because of the national security requirements, deception capability, the requirements of geography, and the actual physical combat capability of the forcible entry concept, it will be assumed that the forcible entry capability is a requirement.

The Form of Forcible Entry

Three ideas support the use of amphibious assault as a required form of forcible entry; power projection, historical successes of amphibious assault, and the future threat.

Power Projection

There are two significant forms of U.S. forcible entry, amphibious assault and airborne assault.[62] In testimony before the Senate Armed Services Committee, Marine Corps Commandant Alfred Gray made the following statement in 1988, "Amphibious shipping (amphibious assault) is this country's only means of sustainable power projection . . . and forcible entry."[63] Airborne assault lacks organic sustainment resources, detracting from its ability to keep an airhead open for follow-on forces to enter battle.[64]

Historical Success

As some military historians have noted, "the amphibious assault has been the most successful form of

forcible entry into contested areas by U.S. ground combat forces."[65] Perhaps the lack of success for airborne forces may be because they are a relatively recent development, but in any case, the ability to sustain the amphibious assault makes it a more powerful combat force.

Between the years 1945 and 1988, U.S. forces have been called upon more than 200 times in response to crises. Most of the responses were naval, and most of the naval responses were amphibious.[66] Regional conflict will tend to be the threat in the future, and most of the conflicts that are going to happen will happen in the major cities throughout the world, most of which are within 150 miles of water.[67] Amphibious forces and their assault capabilities appear to be the "force of choice."

The Future Threat

The export of Soviet weapons and tactics to the third world nations also causes concern. While the Soviet Union has died as an entity, there are still Soviet style states that employ Soviet doctrine and equipment. This means the U.S. should be prepared to conduct an amphibious assault against a Soviet style threat. Specifically, the U.S. should be able to conduct the over-the-horizon amphibious assault. The Marine Corps has studied this issue and decided that by the year 2000, over-the-horizon amphibious assaults would be required against twelve

potential third-world opponents.[68] The assumption then, is that forcible entry will remain a requirement due to the testimony of the General Gray, the successful history of the amphibious assault, and the need to meet the future threat.

The Form of Amphibious Assault

The last assumption concerns the form of amphibious assault. Methods other than OTH assaults have been discussed by other countries, such as Great Britain, and some military writers here in the U.S., to substitute for amphibious assault, including the use of submersibles and remote approaches.[69]

The Submersible Approach

The submersible approach is an underwater approach to the assault beach. This type of approach reduces exposure of the troops to enemy fire, and maintains the element of surprise. Currently being developed is a submersible craft designed to carry troops from a mother ship thirty miles from the beach, submerge to depths up to 300 feet, move to the beach submerged, and disembark the assault troops on the beach.[70]

The Remote Approach

Another method designed to reduce troops' exposure to hostile fire is the remote approach. In this approach,

unmanned air cushion vehicles carrying missiles, machine guns, and other weaponry would lead the assault to the beach, controlled by human operators stationed over-the-horizon. These unmanned vehicles would soften the beach defenses, and then be followed by the manned assault waves.[71]

These two types of approaches may be less costly in terms of casualties to men and equipment. Because of this reduced cost in casualties, one or both options would be preferable to the OTH assault. However, because of the technological difficulties remaining with these options, the manned OTH assault is currently still the only alternative to the conventional assault.

Definitions and Descriptions

Some recurring terms throughout the study will be defined, followed by a description of how to conduct amphibious assaults.

Basic Terms

Amphibious Assault: The principle type of amphibious operation which involves establishing a force on a hostile shore.[72]

Beachhead: A designated area on a hostile shore which, when seized and held, ensures the continuous landing of troops and materiel, and provides maneuver space

requisite for subsequent projected operations ashore. It is the physical objective of an amphibious operation.

Conventional Amphibious Assault: An amphibious assault conducted in accordance with the current 1962 doctrine, using conventional landing craft, helicopters, and amphibious assault vehicles.

Over-the-Horizon Amphibious Assault: An amphibious assault conducted with the amphibious task force at least twelve miles from the landing beach.

Amphibious Operating Area (AOA): A geographical area, delineated in the initiating directive, for purposes of command and control within which is located the objective(s) to be secured by the amphibious task forces. This area must be of sufficient size to ensure accomplishment of the amphibious task force's mission and must provide sufficient area for conducting necessary sea, air, and land operations.[73]

Forcible Entry: Seizing and holding a military lodgement in the face of armed opposition.[74]

Landing Beach: That portion of a shoreline usually required for the landing of a battalion landing team. However, it may also be that portion of a shoreline constituting a tactical locality (such as the shore of a bay) over which a force larger or smaller than a battalion landing team may be landed.[75]

Landing Craft Air Cushion (LCAC): A surface borne landing craft capable of traveling at high speeds due to its surface effect of transiting on a cushion of air above the ground or water.

Other definitions may be found in Appendix A. Descriptions of personnel and equipment may also be found in Appendix A.

Doctrine and Procedures

The conduct of the conventional amphibious assault will be discussed first, then the conduct of the over-the-horizon assault.

The conventional assault, described in the Naval Warfare Publication (NWP) 22 series, is as follows. The conventional assault takes place in the amphibious operating area (AOA). The AOA includes the portions of water and land where the assault will occur (See Figure 2, Appendix B.) It usually includes the maneuvering room for the ships at sea, maneuvering room for the landing force ashore, and the landing force objectives.

Inside the AOA are the landing beaches. The number of beaches will depend on the size of the landing force, the geography, the mission, and the time requirements for the buildup of forces ashore.

Approaching each of the landing beaches is a boat lane, usually extending four thousand yards directly outward

from the beach (see Figure 3, Appendix B.) The boat lane is where the landing craft will travel from the ships to the shore.

Anchored on the right flank on the seaward end of the boat lane (4000 yards from the beach) is the Primary Control Ship (PCS). This ship is responsible for the movement of the landing craft ashore, guiding them in the proper direction and ensuring they land in the center of the beach at the correct time. Anchored on the left flank at the seaward end of the boat lane is the Secondary Control Ship (SCS). The primary duty of the SCS is to assume the function of PCS should the PCS encounter difficulties.[76]

Seaward of these two ships is the Sea Echelon Area (SEA). This area usually extends from about five to twenty nautical miles (NM) from the beach. It is then subdivided into several areas from where each of the different ships can operate. On either side of the operating areas are the LST transit lanes. These are the ships that carry the amphibious assault vehicles (AAV). Between the operating areas is the utility landing craft (LCU) transit lane, where the landing craft travel from their ships to the boat lane. Finally, closer in to shore are the fire support areas (FSA), where naval gunfire support (NGFS) bombards the beach before the assault craft land.[77]

Landing craft transit the boat lane in waves. The first few waves generally consist of amphibious assault

vehicles. This is the forcible entry portion of the assault. AAVs provide armored fighting vehicles on the beach that can cover the remaining waves. The waves following the AAVs consist of the landing craft. As noted earlier, these are the LCUs and the mechanized landing craft (LCM-8s). The first of these landing craft will contain the beachmasters and their equipment. The remainder will contain the initial assault forces, usually tanks and troops.[78]

As landing craft off-load their troops and cargo, they retract from the beach and return to the amphibious shipping to pick up their next load.[79] The process then repeats itself until the entire organization has disembarked.

Figure 4, Appendix B shows the helicopter portion of the assault. Helicopters carrying mostly troops fly in from the amphibious helicopter ship operating area via predetermined routes to landing zones some distance behind the landing site. This is the concept of vertical envelopment.[80]

The helicopters carrying troops usually land a short distance from the landing beach at approximately the same time the first wave of AAVs lands on the beach. The AAVs then provide protection or a diversion, since the helicopters have no protective armor. Attack helicopters escort troop carrying helicopters since they have no

offensive firepower of their own. Attack helicopters then provide protection to the troop helicopters when they land in their landing zones.[81]

Now that the conventional amphibious assault procedures have been examined, the differences between it and the over-the-horizon amphibious assault can be examined. Several differences include communications, equipment used, and the distance from the landing beach. The main difference is the distance from the amphibious shipping to the landing beach. As seen earlier, in the conventional assault, ships approach to four thousand yards from the beach. In the over-the-horizon assault, the ships are generally between twelve and one hundred miles from the beach, and the sea echelon area is greatly enlarged.

One other difference involves the craft used. At these distances, air cushion landing craft (LCACs) become the primary landing craft. With speeds up to forty knots while fully loaded, they can traverse the distances in as little as eighteen minutes. LCUs would take over an hour to reach the beach, even at a distance of twelve miles.

The lack of using AAVs as landing craft is another difference in the OTH assault. Since AAVs have a range of forty-five hundred yards, they clearly cannot make it from the ships to the beach during OTH assault.

The main procedural difference lies in the control of the landing craft. In the conventional assault, the PCS

guides the landing craft into the landing site, directing the crafts' direction of travel and speed. In the over-the-horizon assault, the LCAC control ship (LCS) only gives guidance to the LCAC when the LCAC is making a gross navigation or timing error. The approach for the LCAC is more similar to the helicopter approach than the conventional landing craft approach (See Figure 5, Appendix B.)

1983 DON Lift Study

In 1983, the Department of the Navy published the Long-term Amphibious Lift Requirement and Optimum Ship Mix Study (DON Lift). This study required the capability for the U.S. Navy and Marine Corps to simultaneously lift a Marine Expeditionary Force (MEF) and a Marine Expeditionary Brigade. It also proved the need to be able to land the assault echelons (ground combat elements) of each of these forces within ninety minutes; that is, all combat forces had to be on the beach within one and one-half hours.[82] This study still represents the current requirements for the U.S. Navy and Marine Corps based on the threat and will be referred to several times throughout this thesis.

Advantages

With the understanding of both types of assault, a common basis is now available for comparison of advantages

and disadvantages. With respect to the conventional assault, several advantages accrue. These advantages include shorter turnaround times, communication capabilities, the use of AAVs, the lack of noise, the availability of naval gunfire support, established methods, and the use of line charges. A discussion of each of these advantages will show how the conventional assault favorably compares to the over-the-horizon assault.

Turnaround Times

The conventional assault provides shorter turnaround times. While landing craft performing conventional amphibious assault travel at slower speeds, they also have shorter distances to transit. An LCU will make the transit of four thousand yards to the beach in approximately ten minutes. An LCAC coming from over-the-horizon will make the transit of twelve miles in eighteen minutes. While this small difference in times seems negligible, consider that each landing craft must return to the amphibious shipping several times to off-load the ships. This difference of eight minutes will accumulate to over an hour difference after only four round trips for each landing craft, a significant amount of time in an amphibious assault.

Communications

Communications is the second advantage the conventional assault offers. Since both the ships and landing craft operate in close to shore during the conventional assault, short range radio communications are possible between the ships and landing craft. Short-range communications are also possible between the ships and personnel on the beach. Additionally, visual signals, such as the use of flashing light, are available to direct the landing craft. In the over-the-horizon assault, visual signals are not possible because of the ranges used, nor are short-range communications. Long-range communications, traditionally less reliable and more detectable, must be used to talk to the landing craft and forces on the beach.[83]

Availability of AAVs

Another point favoring the conventional assault is the use of AAVs. As noted earlier, AAVs provide the forcible entry capability to the amphibious assault. They also provide tactical mobility during the subsequent shore operations.[84] With a range of forty-five hundred yards, they are impractical for use in the over-the-horizon assault. The AAVs don't have the range to transit that far. The other option to use them in the OTH assault would be to bring the tank landing ships (LSTs) in closer to the shore and launch the AAVs only from the conventional distance.

Unfortunately, this would negate the advantages of the OTH assault (discussed later). So the OTH assault must function without the forcible entry capability.[85]

Noise

The relative lack of noise is another advantage of the conventional assault. Conventional landing craft approaching the beach make very little noise. LCACs approaching the beach in the OTH assault are extremely noisy and can be heard from several miles away. So the conventional assault provides a silent approach, partially compensating for the lack of tactical surprise.

Naval Gun Fire Support

A sixth advantage lies in the availability of naval gunfire support to the conventional assault. The battleships (with their 16 inch guns) are no longer in commission, and cannot support any type of assault. Other current naval guns have the range to adequately support a conventional assault, both in pre-landing bombardment and during the assault. The pre-landing bombardment is designed to destroy enemy defenses on the beaches, disrupt or interdict routes to the beach over which reinforcements would travel, and to suppress defensive fire when the assault forces are approaching the beach. In the over-the-

horizon assault, the naval gunfire ships do not have the range to effectively bombard the beach.

Established Methods

Another point supporting the conventional assault is that it rests on established equipment. Equipment currently in use may be old and predictable, but the U.S. knows that it works under combat conditions. The over-the-horizon assault requires the use of expensive and mostly untried technology. The new technology of the air cushion (found on the LCAC) and two other potential technologies (tilt-rotor for the MV-22 Osprey, and the hydropneumatic suspension system for the Advanced Amphibious Assault Vehicle (AAAV), both discussed later) are still in testing and development. None of them have been tested in combat.[86]

Line Charges

Perhaps the most important advantage in the conventional assault is the availability of line charges. AAVs are the platforms that carry line charges. A line charge is a weapon that is thrown out ahead of its carrying platform, and explodes the mines in and around its path. What this means is that an AAV can land on a mined beach and use its line charge to clear a lane, and then vehicles can safely follow in the cleared lane. Since AAVs are not used

in the OTH assault, a mined beach presents a serious threat to vehicles discharged from the LCACs.

Disadvantages

While there are advantages to the conventional assault, there are many disadvantages as well. These disadvantages include defense of the amphibious shipping, the lack of surprise, beach and water obstacles (to include mines), beach physical limitations, less flexibility, and its support of attrition warfare. A separate disadvantage for discussion in either assault is the use of LCACs.

Defense of Amphibious Shipping

The first disadvantage of defending the amphibious shipping is the main reason for the existence of the OTH assault. As noted earlier, ships close in to the beach are subject to mine strikes, fast moving anti-ship cruise missiles, and precision-guided munitions. This lack or limited ability of defense can be costly in terms of ships and lives. Moving the shipping further out from the beach increases the ability to defend the amphibious task force, potentially saving those ships and lives.

Surprise

Lack of operational and tactical surprise is also a disadvantage to the conventional assault. Satellite imagery

is easily obtainable, and the location of the task force and its direction of travel can give clues to where the conventional assault, because of the expected operating distances. So satellite imagery can give an enemy a general vicinity where the amphibious fleet will strike. Additionally, once the ships are at their destination, they must close the beach, and are easily spotted, giving away the location of the assault. The OTH assault limits this predictability. While the satellite imagery can give away the general vicinity of the amphibious task force, it cannot give the exact landing location of the OTH assault. The OTH assault force is not visible from the beach, and is far enough away from land to preclude disclosing the landing sites.[87] Because of this, tactical surprise is still achievable at the landing beach. This prevents hostile forces on the beach from rushing reinforcements into the landing beach, while in the conventional assault, reinforcements can be brought in because of the known landing site.

Obstacles

Another point against the use of the conventional assault is the use of obstacles. Many countries build obstacles on the beach, or in the shallow water near the beach. The obstacles can then penetrate and rupture the hulls of landing craft. Mines are also laid on the beaches

and offshore to damage landing craft, ships, and vehicles on the beach. Conventional landing craft and vehicles have very little defense against these obstacles and mines. In the OTH assault, the use of LCAC significantly reduces this disadvantage. Since the LCAC rides above the water, underwater obstacles will most likely not penetrate its hull. It also makes it much less susceptible to setting off mines.

Beach Limitations

Physical beach limitations are a fourth disadvantage to the conventional assault. Since landing craft operate in the water, the beaches they assault must permit approach to the beach. This means the beach must have the proper gradient to allow approach of the landing craft. If a beach does not have the correct gradient, then the landing craft will never reach the beach. Either the water gets too shallow too far from the beach, or the beach is essentially an underwater cliff and will not support the weight of the landing craft. Studies have shown that only 15% of the world's coastlines can support a conventional assault, while 70% can support an OTH assault, a significant difference.[88]

Flexibility

Another disadvantage to the conventional assault is the lack of flexibility. Since the amphibious ships have to

approach within 4000 yards of the shore, and the conventional landing craft and helicopters have such limited ranges, hostile forces can concentrate their defenses at the point where the ships are close to the shore. Somewhere near the ships, the assault will take place. With the over-the-horizon assault, the ships are much further out, the landing craft have a greater range, so a much larger piece of shoreline is threatened. An example of the flexibility is to assume an amphibious task force that can conduct an OTH assault is 150 miles off the coast of Norfolk, Virginia. Within twenty-four hours, the task force can conduct an assault anywhere along the coastline between New York City and Wilmington, North Carolina.[89] This, combined with the fact that LCACs can land on 70% of the world's coastlines, cause the enemy to disperse his forces. Dispersed enemy forces are less of a threat, and could result in reduced casualties.

Attrition Warfare

The last disadvantage of conventional amphibious assault is that it supports attrition warfare, instead of maneuver warfare. As noted earlier, this generally results in more casualties in the conventional assault than in the OTH assault.

The LCAC Disadvantage

As mentioned above, a common disadvantage to either assault is the LCAC. While the LCAC provides a large technological advantage in terms of speed and range, it has problems inherent in it that are not found in the conventional displacement landing craft. The first problem is that it is easily detectable. While small in size, its engines produce a large amount of noise, also throwing up a "rooster tail" of water behind it.[90] Both characteristics make the LCAC detectible by sight and sound, potentially eliminating tactical surprise.

Another difficulty with the LCAC is that it consumes a great amount of fuel. With the amphibious task force operating at the expected range of twenty-five to fifty nautical miles, it is expected that the LCAC would have to refuel every time it returns from the beach. This would greatly increase the turnaround time, lengthening the amount of time required to get the combat forces on the beach.[91]

A third disadvantage to the LCAC is that it cannot operate with all types of amphibious ships, especially the amphibious cargo ships. This means that conventional displacement landing craft must be utilized in off-load, negating the speed and distance advantages of the LCAC.[92]

A last disadvantage to the LCAC, and perhaps the most important is the lack of protective armor. The LCAC has advanced technology, but all this technology is

extremely vulnerable to enemy fire. One bullet through the gas turbine engines can cripple the LCAC, and effectively disable its primary advantage of speed.[93]

Limitations

There are two limitations to this study; forces for the conduct of the assault, and follow-on echelons. Follow-on echelons consist of troops and equipment landed after the initial assault.

The first limitation of this study is inherent in the title. The forces being examined are limited to U.S. Navy and Marine Corps forces. Other countries, such as Great Britain and the former Soviet Union also have forces that are capable of conducting over-the-horizon assaults, but are not examined in this study. Additionally, one other force that also has the mission of amphibious assault is the United States Army. Because their tactics, techniques, procedures, and doctrine are the same as the U.S. Navy and Marine Corps they are not dealt with as a separate issue in this study.

The second limitation to this study is the examination of the follow-on echelon. This issue is extremely dependent on strategic sealift, and while strategic sealift is an issue with the assault echelon, the strategic sealift for the follow-on echelon is too large an issue to examine in this study.

The aforementioned issues clearly indicate that conventional amphibious operations may be obsolete. Five options exist that address the amphibious operations dilemma are: (1) continue on using the same doctrine and procedures, (2) develop an enhanced capability to conduct a forcible assault by air, (3) develop an underwater assault method, (4) modify the current method of surface assault, and (5) some combination of the previous four options.

To continue using current amphibious operations methods is to invite disaster. An enhanced air forcible assault method would still have problems sustaining itself, and is subject to the same modern weapons technology the conventional amphibious assault suffers from. The underwater amphibious assault requires technology not yet available, and in any case, the underwater units would have to surface sometime before landing on the beach. This would make it subject to mines, underwater obstacles, and modern weapons.

The only feasible option is to modify the current method of attacking on the surface, which has resulted in the development of the over-the-horizon amphibious assault.

The remainder of this thesis will examine what has been done in the area of over-the-horizon amphibious assault; what the current and projected capabilities are and, what the problems are, and what are the solutions.

CHAPTER TWO

LITERATURE REVIEW AND METHODOLOGY

As in many military studies of current or forward-looking topics, there is always some material that is classified. For the purposes of this thesis, most available material was examined, whether classified or not. However, only unclassified material was used for development and supporting positions.

As noted earlier, amphibious operations have existed for hundreds of years, and much has been written about them. The over-the-horizon assault, though, has been in development since the early 1980s, with the first written works appearing in 1982. For purposes of this thesis, with the exception of historical background and conventional amphibious assault doctrine, only material later than 1982 was used.

There are several sources of material available for research into this area. They include professional military magazines, other theses, some studies, books, interviews, doctrine, and lessons learned.

Magazines

The most useful of the professional military magazines included Marine Corps Gazette and Proceedings. The Marine Corps Gazette is a magazine that covers all aspects of the U.S. Marine Corps, including one of their major missions, amphibious assault. Contributing authors include majors who discuss technical problems at the operator level, up to the Commandant of the Marine Corps, who discusses theory and missions.

Most of the material available from the Marine Corps Gazette is at the operator level. Those articles mostly discuss problems with execution of the over-the-horizon and conventional amphibious assaults. Most authors do not, however, provide solutions to the problems they discuss, though some do.

Like the Marine Corps Gazette, Proceedings is a magazine published by the United States Naval Institute, and it covers the full range from technical problems to theory and doctrine. Also like the Marine Corps Gazette, Proceedings tends to concentrate at the operator level, and discusses mostly problems, though it does offer some solutions.

A third periodical that also contributed to the field of study is Amphibious Warfare Review. This magazine totally devotes itself to the area of amphibious warfare, unlike Proceedings and Marine Corps Gazette. This magazine

tends to devote itself to equipment and the future of amphibious warfare.

Some of the articles in the above magazines that made major contributions to this thesis include: "The Over-the-Horizon Alternatives," by Robert Earl, in the Marine Corps Gazette; "Over the Horizon-2000," by Douglas Humston, in Amphibious Warfare Review; "The High Cost of Reaching the Beach," by Jon Hoffman, in Proceedings; "Is the Doctrine Viable?", by Richard Moore, in Proceedings; and "The Character of Future Warfare," by Steven M. Shaker, in Amphibious Warfare Review.

Theses and Monographs

The next area of literature is theses. Several theses and monographs have been written about various aspects of amphibious assaults, but they have been geared to using equipment in unusual ways. For the most part, they did not contribute to thesis development, except as background material. A few monographs did make significant contributions to the study of over-the-horizon assaults.

One monograph written in 1987 by John MacIntyre for the Naval War College entitled "Amphibious Operations: 1995" is a forward looking article with good background and significant points in favor of the OTH assault. A second monograph written by Robert Howe in 1988 for the Industrial College of the Armed Forces examined the use of the LCAC and

other assets in an OTH assault. Another monograph written for the Naval War College in 1988 by Paul Cariker entitled "The Over-the-Horizon Amphibious Assault: A Quantum Leap Forward?" takes an objective look at both sides of the issue, and makes significant arguments both ways. A fourth monograph written by Dale Rauch for the Naval War College in 1987 entitled, "Amphibious Ships and Landing Craft: Past, Present, and Future" takes a look into the future, as well as examining some potential alternatives to the over-the-horizon assault.

Studies

The third area of literature is studies. Most of the studies reviewed were done by the Center for Naval Analyses (CNA). Those studies were geared toward equipment performance characteristics and efficiency of different operations. There was good material in the studies, but much of it was classified and unusable. One study that was usable was "LCAC Survivability Study" written by the Center for Naval Analyses in 1988 contributed significant research to the feasibility of using the LCAC in the OTH assault. Another study by CNA in 1983 entitled "Analytical Results in Support of the Future Assault Landing Craft Mix Study" brought forth some good alternatives and a look into how OTH should currently be performed.

Books

The fourth area of literature review is books. Most of the books are older than 1982 and were stories of previous amphibious operations. One book in particular, though, was written in 1991 and included discussions of several current topics. The book, Amphibious Operations: The Projection of Sea Power Ashore, by Michael Evans, discusses over-the-horizon assault for U.S. forces as well as Soviet/Russian and English forces. It also discusses equipment in use, as well as equipment that is in the building or planning process.

Another good source was the compilation of essays entitled, Assault from the Sea: Essays on the History of Amphibious Warfare, edited by Merrill L. Bartlett. It contained several good accounts of historical landings, and the development of doctrine. Even though it was written in 1983, it also contained some good essays on future amphibious operations.

An excellent book discussing the development of amphibious warfare doctrine is Amphibious Warfare Development in Britain and America from 1920-1940, written by Kenneth J. Clifford in 1983. This book tells the remarkable story of how amphibious warfare is on the few doctrines developed during peacetime and survived not only one war, but several without significant changes.

A last good source of information was The Maneuver Warfare Handbook, by William S. Lind, written in 1985. While only a small portion of it deals with amphibious warfare, it discusses in detail the concept of maneuver warfare and how it has affected warfare.

Interviews

Another source of material is interviews with personnel who either have experience or who are in the planning or development process. While the author did not conduct any interviews, several magazines contained interviews with prominent people who deal with amphibious matters.

Doctrine

The doctrine for U.S. amphibious warfare was first written in 1934. This was a peacetime project, written at Quantico, Virginia, between the First and Second World Wars. This doctrine was later updated in the late 1950s, though it wasn't significantly different from the 1934 version. Some further minor revisions were made in 1962. In 1987, the Joint Chiefs of Staff adopted the 1962 version as JCS Pub 3-02, the joint doctrine for amphibious warfare, still essentially the 1934 doctrine.

The procedures for conducting an amphibious assault can be found in the Naval Warfare Publication 22 series. This information is unclassified, and with a few minor revisions in recognition of technological advances, the same procedures used in conjunction with the 1934 doctrine.

Lessons Learned

More information was drawn from the 1992 version of the Joint Universal Lessons Learned system, a military database of lessons learned from various operations and exercises. The information in this database is generally classified SECRET. In any case, specific lessons learned are non-attributional, though trends in lessons learned are not.

Databases

Many databases provided sources of information in support of the study. The key database was the Defense Technical Institute Center, which is comprised mostly of military studies and topics. The keywords most useful in the searches included AMPHIBIOUS, AMPHIBIOUS SHIPS, AMPHIBIOUS WARFARE, AMPHIBIOUS OPERATIONS, LANDING CRAFT, and HELICOPTERS. Most of these keywords yielded some source of information in every database searched.

Writing Trends

The literature review revealed mixed results on the issue of OTH assaults. Some authors are fully supportive of the OTH assault concept and have made proposals to improve it. Other authors support the concept but question the technology to support it. Still other authors recognize the need for change from the conventional amphibious assault, but reject the concept of the OTH assault. Few of these authors, though, offer another solution.

The most active authors contributing to the field of OTH study include Lieutenant Colonel Robert Earl, of the Marine Air Ground Task Force Warfighting Center in Quantico, VA; Lieutenant Commander Terry Pierce, who has served on many amphibious ships; and Major Thomas Linn, previously of the services plans division at Headquarters, Marine Corps. Each of these authors has contributed several articles to the study of amphibious assault, and are forerunners in tactics development.

Research Methodology

The research methodology used in this study is basically descriptional. As noted earlier, literature exists discussing various aspects and equipment of amphibious assaults. There have been many studies done on both conventional and over-the-horizon amphibious assaults, but no literature has been found to even suggest that the concept of

the over-the-horizon assault is feasible. Research of the current literature shows that the U.S. Navy and Marine Corps have been forced to utilize OTH assault, without examining its feasibility.

The current conventional assault has been in existence since 1934, and has survived World War II, the Korean War, and several smaller conflicts. It is a proven, workable concept, even if it is not always the most desirable solution. The first section of Chapter Three will look at the U.S. capability of conducting an OTH assault, essentially a cross between conventional assault and OTH assault. Lessons learned from exercises will show potential deficiencies, and some alternatives will be presented to deal with these difficulties.

Since exercise OTH assaults have also been conducted, there have been some lessons learned brought out by authors, as well as other potential difficulties not yet exercised. The second section of Chapter Three will analyze these deficiencies, and make recommendations to solve the problems with OTH assault in the future.

The last section of Chapter Three will examine some alternatives to the OTH assault. While a judgment will not be made on which method is best, it will provide a different way of looking at amphibious assault, and perhaps provide some ideas to improve OTH assault.

CHAPTER THREE

THE FEASIBILITY OF THE OTH ASSAULT

As previously stated, the current problem with conventional amphibious assault is that modern technology in equipment and particularly weapons have created a potentially lethal environment that current amphibious methods cannot efficiently cope with.

A combination of options presented in Chapter One is necessary to overcome the problems. Over-the-horizon assault is that solution but OTH can be successful only with the inclusion of new equipment and technology.

This chapter will focus on the equipment and technology available for modifying the surface assault to the over-the-horizon amphibious assault.

The Feasibility of the OTH Assault Today

As discussed in Chapter One, the major difference between the conventional and the OTH assault is the distance between the amphibious shipping and the landing beach. In the conventional assault, the ships are between four and ten miles from the beach. In the OTH assault, the ships are between twelve and one hundred miles from the landing beach.

There are three areas that make the OTH amphibious assault currently infeasible; the mixing of LCUs and LCACs, the lack of the forcible entry capability, and hydrographic difficulties.

LCU/LCAC Mix Difficulties

Because of the potential large distance from the beach in the OTH assault, conventional landing craft are at an extreme disadvantage. LCUs and LCM-8s are slow moving, generally under ten knots, which means a slow buildup of combat power on the beach. Additionally, their slow speed makes them an easy target.

Due to the limited number of LCACs though, LCM-8s and LCUs must still be utilized in any amphibious assault. The current method of integrating LCM-8s and LCUs into an OTH assault is to conduct an OTH assault with LCACs. Once the LCACs are proceeding to the beach, the amphibious task force closes in to the beach to the conventional range. This allows the lift capacity of the LCUs and LCM-8s to be utilized without a severe time disadvantage.[1]

Forcible Entry

Perhaps the largest problem with the current feasibility of the OTH assault is the lack of forcible entry. Since the LCACs approach first in the current execution of OTH assault, the forcible entry capability

(AAVs) is not present to force the beachhead open for following forces. This exposes the LCACs and the cargo to the majority of the hostile fire, possibly causing so many casualties and so much damage as to turn away the assault.

Solutions to Forcible Entry

There are two methods of achieving forcible entry, surface means, or air means. The current method of forcible entry via surface means is by using AAVs. The methods for air forcible entry rely on escorting troop carrying helicopters with attack helicopters. Neither method works well in the OTH assault today.

The first alternative, to send the AAVs to the beach first, will provide the forcible entry, and will probably draw the hostile fire away from the following forces. Unfortunately, this requires a portion of the amphibious shipping to close the beach, potentially exposing the ships to the threats discussed earlier, such as precision guided munitions and mines, as well as possibly losing tactical surprise. This loss of surprise will allow the enemy forces to reinforce the beachhead, bringing greater fires to bear on the assault force, probably causing more casualties.

The other possibility open to the amphibious task force, to provide the forcible entry by air means, is to attack first with the helicopters and air assets, with the following forces coming to the beach by surface means. As

noted earlier though, the current fleet of helicopters used by the Marine Corps has no protective armor, which effectively denies them the capability of forcible entry. Attack helicopters can escort troop carrying helicopters, but there are insufficient numbers of attack helicopters to escort all the troop carrying helicopters.

Another argument against helicopters providing forcible entry is that the geography of the beach area may not provide for suitable landing zones to place combat troops and equipment. Additionally, the helicopters are not capable of carrying in the heavy armored equipment, such as tanks, which would be needed to fight to the beach so that following forces could land via surface means.

Hydrographic Difficulties

A second problem arises when combining LCACs and LCUs. As noted earlier, an advantage of an LCAC is that it can cross over 70% of the world's coastline, able to conduct a landing almost anywhere. LCUs and other displacement are limited to approximately 15% of the world's coastlines. Any assault involving both LCACs and displacement craft must be at a point where both craft can conduct landings. In this case, this reduces the available landing beaches to 16%, where the LCUs can operate. This obviously reduces the utility of the LCAC.

Future Feasibility of the OTH Assault

There are several issues that contribute to the development of future feasibility. Of primary importance is the issue of forcible entry. Secondary issues include lift capabilities, communications, naval gunfire support, and mines. An examination of these issues and some possible solutions might show whether or not the OTH assault is even a feasible concept.

Forcible Entry

The primary issue in the accomplishment of the true OTH assault is forcible entry. Remembering that the AAV is what provides the conventional assault its forcible entry, this vehicle is missing in the OTH assault. With a range of forty-five hundred yards, it does not have the range to provide forcible entry in the OTH assault.

Solutions to Forcible Entry

Because of the AAVs short range, planners have developed four options to provide forcible entry to the OTH assault.[2] These four options include: (1) having an LCAC carry AAVs to the beach, (2) having an AAV carried by a platform other than the LCAC, (3) developing a new AAV that is then carried to the beach by the LCAC, and (4) developing a new AAV.[3] The fifth option is not to attack defended beaches, avoiding the need for forcible entry.

The LCAC as an AAV Carrier

The first option is to have the AAV be carried to the vicinity of the beach by the LCAC. The LCAC would then stop approximately four thousand yards off the beach and launch the AAVs from that point. Each LCAC can carry three AAVs.[4] The usual wave of one rifle company embarked in ten AAVs could be transported by four or five LCACs.[5] This is the solution proposed by the DON Lift study.[6]

There are a few concerns with this alternative though; (1) closing the defended beach, (2) the need to modify the LCAC, (3) the number of LCACs available, and (4) the turnaround times. The first concern is the LCAC would have to travel within range of the defended beach,[7] placing these important assets at severe risk.[8] As discussed in Chapter One, LCACs are extremely vulnerable to direct fire, and having them carry AAVs to the beach could reduce the number of LCACs available by exposing them to hostile fire.

LCACs would also have to be modified to be able to launch AAVs, as the bow ramp is not capable of supporting a launching AAV.[9] The cost of modifying the bow ramp in today's fiscally constrained environment may be prohibitive. Further, even carrying three AAVs apiece, LCACs would not be optimally loaded for combat, using less than their full capability.[10]

A third concern remains concerning the number of LCACs in the typical amphibious ready group. Considering

the amphibious task force for a Marine Expeditionary Unit (MEU) normally carries just seven LCACs, more than half the group's LCACs would probably be devoted to carrying the AAVs, a substantial portion of the lift capacity.[11]

A last problem is the turnaround time for the LCACs carrying the AAVs. Because they will not be able to carry the normal load, they will be forced to return to the amphibious shipping to go through the loading process, and then return to the beach.[12] This process would take approximately ninety minutes.[13]

In summary, even if the LCACs could be used to carry the AAVs, they would be vulnerable, and there would be insufficient LCACs available to lift the AAVs and rapidly build up combat power ashore, a goal of OTH assault.[14]

A New AAV Carrier

The second option is to have the AAV carried by a different platform. The platform must not violate the requirement of over-the-horizon, so a ship closing the beach to launch the AAVs is not possible. There are no other platforms that can carry the AAVs, so the alternative is to develop a new craft to carry the AAV to the beach. This would free the LCACs to perform their primary mission and avoid the danger of the hostile beach.[15] Any platform would still have to stop some distance from the beach and launch the AAVs, but it is certainly feasible. The drawback is

that there are significant costs associated with this option, especially dollars, manpower, and the development and maintenance of new equipment.[16] An additional concern is transporting this AAV carrier in the amphibious ships, already crowded with combat equipment.[17]

A New AAV with Carrier

Another option is the development of a new type of amphibious assault vehicle that would be carried by an LCAC to a position near the beach and then launched. Once again, this poses the problem of using LCACs. While it is presumed that the new AAV would have a longer range, and therefore the LCACs would be safe from hostile beach fire, the LCACs would again be unable to perform their primary purpose, along with the resultant loss of time. An additional consideration is the cost of development of a new AAV.

A New AAV

The fourth option is to develop a new AAV that has over-the-horizon capabilities, specifically the range to launch from over-the-horizon, and a higher speed, to minimize the transit time. The major difficulty lies in the cost of developing this new AAV, as well as developing the technology to make the AAV meet its required operating characteristics. The U.S. has begun work on this new AAV, called the Advanced Amphibious Assault Vehicle. Recent

testimony has put the cost for research, development, and procurement at $6.6 billion dollars, over eight times the size of the 1991 procurement budget.[18]

Attack the Undefended Beaches

One other option being pursued by some people is to continue using the AAV and assault only undefended beaches. A similar option is to attack undefended beaches and not use AAVs, but just the LCACs since forcible entry will not be required. Both options have become especially popular during this time of budget cutting.[19]

Either option assumes there is always an undefended beach to assault. While it may be true some of the times, it will certainly not be true all of the time. Also, as noted in Chapter One, the AAV plays an important subsequent combat role following the move to the beach, tactical mobility. Without the AAV, another vehicle or weapons system is going to have to replace the AAV. This weapons system will have to compete for space in an already crowded amphibious ship, and if it is a new weapons system, dollars must be budgeted for it, possibly offsetting any savings by not developing the AAAV.[20]

In any case, either option does not support the assumption in this thesis of the requirement for forcible entry. They are only mentioned because they are options that have some supporters.

Air Forcible Entry

Other people propose forcible entry entirely by air, and then attacking back toward the beach. This way, surface forcible entry is not required, and all combat troops and equipment could be brought ashore by LCAC.[21] This idea also has several good and bad points. Supporting the argument of air forcible entry is cost savings and rapid combat power buildup. Arguments against air forcible entry include the requirement for heavy equipment, the lack of a forcible entry air platform, and the money already spent on development of the AAAV.

If air forcible entry could be used, many dollars could be saved by not building any sort of AAAV. Since landing troops by air is faster than LCAC, combat power could be built up quickly.

Unfortunately, not all the equipment could be brought in via air transport. Only surface means can be used to bring in the tanks and heavier equipment.

Another point against only using forcible entry by air is that there is no air delivery vehicle capable of forcible entry. Helicopters have no protective armor, and the Osprey (discussed later) has thin armor, too thin to be the lead attack. So any dollars saved from the AAAV would merely be diverted to building an air delivery vehicle capable of forcible entry. The money already spent on the AAAV would be wasted.

The Advanced Amphibious Assault Vehicle

The alternative the United States has taken is to develop the AAAV. The AAAV is designed to be the third leg of the "triad," the other two legs being the LCAC and MV-22 Osprey (discussed later).[22] To ensure it has the forcible entry capability, it is being designed to minimize radar detection and infrared signature, as well as being armored for protection. These survivability aspects will ensure the AAAV can get combat forces onto the beach.[23]

Lift Capacity

Lift capacity has always been a concern for U.S. Navy and Marine Corps planners. With the objective of putting maximum combat power on the beach, planners have always been concerned with placing as much equipment as possible on the amphibious shipping. An additional concern is the speed at which the troops and equipment are transported from the ships to the assault beach.

There are two major areas of concern with lift capacity. The first is strategic lift capacity, the amphibious shipping required to carry a combat organization to the vicinity of the assault beach. The other concern is the tactical capacity, the capacity to transport the troops and equipment from the ships to the beach in an assault.

One mission of the U.S. Navy and Marine Corps is power projection. When conducting amphibious operations, this power projection is made of two components, strategic mobility (lift) and forcible entry.[24] The second component, forcible entry has already been addressed in this thesis. The first component, strategic mobility has not, though it is just as important. If the troops cannot get to the vicinity of the assault beach, it is impossible to force an entry and project power.

President Bush said in 1990:

> In an era when threats may emerge with little or no warning, our ability to defend our interests will depend on speed and agility. And we will need forces that give us a global reach. No amount of political change will alter the fact that we are separated from many of our most important allies and interests by thousands of miles of water . . . . We'll have to have air and sealift capacities to get our forces where they are needed, when they are needed.[25]

This applies to amphibious forces as well. The U.S. Navy must provide the means to get the combat troops and their equipment from their port of embarkation, through the oceans, to the vicinity of the beach, and finally onto the beach.

There are three areas of strategic lift which will make the OTH assault infeasible; the loss of amphibious ships (mainly due to decommissioning), the number of LCACs

that can be carried by amphibious ships, and the loss of the transport ship for the AAVs.

The 1983 Department of the Navy Lift study requires the capability to move a Marine Expeditionary Force and Marine Expeditionary Brigade simultaneously.[26] Remembering that the study requires that the assault echelons of each of these units be landed within ninety minutes, it has been determined that this will require seventy-five ships to move the assault echelons of this force.[27] The current amphibious ship retirement and replacement plan shows that the size of the amphibious fleet will peak at sixty-nine ships in 1994, and by the year 2001, will have declined to forty-nine ships.[28] By the year 2007, almost 80 percent of today's amphibious ships are programmed to retire.[29]

Another aspect of lift capacity is the ability to carry the LCAC. Current amphibious task forces are limited in the number of LCACs they can transport to the AOA. The LHD class ship can carry three, while the LSD-41 class ship can carry four, but other amphibious ships can usually carry one at most. Since the number of LCACs will be limited, multiple trips will be required by the LCAC in the OTH assault to get the assault echelon on the beach. Because of the distances involved, this will not allow for the required rapid buildup of combat forces on the shore.[30]

A further aspect of lift capacity is the ability to carry AAVs or AAAVs. These vehicles have traditionally been

carried by the LSTs. The LSTs, with their dry well deck, are unable to carry either displacement landing craft or LCACs, so the most efficient place to put the amphibious assault vehicles is on the LSTs. With the LSTs being decommissioned, a new platform will have to be designated to carry them. The disadvantage then becomes whatever room is designated for the stowage of AAVs is room not available for landing craft.

Recommendations to Solve the Strategic Lift Deficiencies

With the recent trend toward downsizing the military, the capability to lift both a MEF and a MEB is rapidly becoming a dream. One obvious solution to this dilemma is to reduce the lift requirement. Another potential answer is not to retire the amphibious shipping. The U.S. could also opt to build more amphibious ships. A fourth possible solution is to reduce the "footprint" of a MEB assault echelon, or the amount of equipment a MEB needs to conduct an assault. The last answer discussed is the self-deployability of the MV-22 Osprey.

Reduction of the Lift Requirement

In 1991, the lift requirement was reduced to being able to transport 2.5 MEBs, a significant drop in capacity that was driven by fiscal constraints, not the threat to U.S. security.[31] Unfortunately, this is the wrong reason to

lower the requirement. Other factors, such as the size of the MEB and some optimistic assumptions in the DON Lift study show the 2.5 MEB lift requirement is the minimum capability still needed.

First, the assault echelon of the MEB is not big enough to establish and maintain a beachhead large enough to allow forces to conduct a follow-on land campaign. The MEB is required to establish the initial beachhead, with the MEF following on to maintain it.[32] U.S. fiscal constraints do not reduce the threat.

Another reason the lift requirement should not have been reduced is because of the assumptions used in the 1983 study. These assumptions include: (1) no threat, (2) high availability rates, (3) no attrition, (4) impossible turnaround times, and (5) no accounting for cross-decking and administrative moves. The study basically assumed an administrative (non-combat assault) against an enemy who was not going to fight back.[33] If the requirement were based on a threat under these conditions it is obvious that even the MEF plus a MEB capability may be too small. In any case, because of this requirement and the assumptions it was derived from, it is clear the U.S. Navy has a significant shortfall in strategic lift capacity.

Retirement of Amphibious Shipping

Another possible solution is to simply not retire the amphibious ships, and perhaps put them through a ship life extension program. Unfortunately, cost benefit analysis show that this is not economical. Older ships, even if they have been upgraded, still would cost more to operate than to upgrade them. Another concern is the survivability of these older ships, especially when confronted with modern weaponry. They are simply less capable than the newer ships being built.[34]

Build Amphibious Shipping

A third solution is to build more amphibious shipping. Any shipbuilding program would have to be ambitious though. If three amphibious ships were funded between the years 1993 and 2003, the Navy would still only have an estimated fifty-six ship amphibious fleet by the year 2008.[35] This is still almost twenty-five ships short of the seventy-five ship requirement. Given the current fiscal restraints though, it is unlikely that any ambitious shipbuilding program will occur. In fact, the 21st century amphibious fleet is projected to be six LHDs, five LHAs, eight LSDs, and three cargo variant LSDs, for a total of twenty-two ships, plus an unknown number of the LX class (discussed later), falling well short of the 1983 DON Lift requirement.[36]

The facts above seem to indicate the capability to lift a MEF and a MEB will never be met, but the future is brighter than indicated. While it is projected that there will be only forty-nine ships in the year 2001, the majority of the amphibious ships entering the fleet are the large LHD class, capable of carrying many more troops and much more equipment that the ships leaving the fleet. But this is not the entire answer. While the LHDs carry more, they can't entirely make up for the lost ships.

To help alleviate this deficit in lift capacity, the U.S. Navy has programmed another amphibious ship, currently designated the LX class. This ship class is designed to replace the LPDs, LSTs, and the old LSD classes.[37] The LX will be capable of carrying 700 troops, two LCACs, and can support either the CH-46 or the MV-22 Osprey.[38] Introduction of the LX class will replace the majority of the capabilities of the ship classes it is replacing, but not all.[39] This ship will not be able to beach itself and off-load troops and vehicles through the ship's bow like the LST could.[40] Additionally, since the number of LXs to be built has not been determined yet, there is no telling how much lift capacity will be available.[41]

Reduction of the "Footprint"

Another aid in the strategic lift problem is to attempt to reduce the "footprint" of the MEF. In 1983, the

MEF used 1,730,000 square feet for its equipment on amphibious ships. By 1990, the square footage had increased to 1,740,000. By transferring some equipment to the follow-on echelons, it can be removed from the amphibious ships, and placed on follow-on ships.[42]

The MV-22 Osprey

Also contributing to the strategic lift capacity is the MV-22 Osprey (discussed later). The MV-22 is self-deployable, tilt-rotor aircraft. Except for the CH-53, almost all conventional helicopters rely on strategic lift assets to effect global deployment (traveling to the vicinity of the assault beach.) The Osprey is an aircraft capable of making its own strategic deployment. This can free up flight or hangar deck stowage space for additional equipment or other helicopters.[43]

Tactical Lift Deficiencies

When the Navy conducted the 1983 DON Lift study, it used a model which required the assault troops to complete the ship-to-shore movement within ninety minutes from twenty-five nautical miles via surface means, and fifty nautical miles via air.[44] This paper will demonstrate the need of surface and air lift. Both methods of transporting troops to the beach are necessary.

There are two mediums available for transfer of men and material from the amphibious shipping to the assault beach. One medium is the sea, the other is air. As discussed earlier, the means to transfer men and material to the beach include LCUs, LCM-8s, LCACs, and the AAV. For air transit to the beach, the CH-46 and the CH-53 are currently in use. As noted in Appendix C, the CH-46 can carry eighteen combat troops at one time, but is completely without armor. The CH-53 is also lacks armor, but can carry thirty-eight combat troops.

The advantage of travel by air is clear. It is significantly faster than surface travel. The CH-46 and CH-53 helicopters can travel at speeds up to 140 knots, over three times faster than the LCAC, and over ten times faster than displacement landing craft. This significantly aids in the rapid build up of combat needed in the OTH assault.

Helicopter travel also has its disadvantages though. These disadvantages include the lack of armor, the need for a landing zone, and the low lift capacity.

The lack of armor makes helicopters vulnerable to virtually any type of hostile fire. Since the landing zones for helicopters are generally behind the beach, helicopters must survive both fire from the beach, and fire from hostile units behind the beach enroute to the landing zone.

The second disadvantage is that the helicopter needs a landing zone. On the initial wave of the assault, this is

difficult to achieve since most landing zones are in possession of the enemy forces.

The last disadvantage of air travel is the low lift capacity of the helicopters. The helicopter is unable to carry large loads, such as a tank. Additionally, while it can transit to the beach three times while the LCAC is making just one, it cannot generally put as much combat power on the shore as the one LCAC load.

A significant problem of travel by surface means is the lack of LCACs available for use. Ninety LCACs are projected to be available to the fleet in the mid-1990s, with no more following.[45] Consider that a MEB requires thirty-five to forty-two LCACs to off-load, and a MEF requires sixty-nine to eighty-three.[46] Now consider the reduced requirement of lifting 2.5 MEBs. This would then conservatively require eighty-seven to 105 LCACs. It can be seen that the U.S. might have some difficulty performing that mission. Now consider the 1983 DON Lift requirement of one MEF and one MEB. This would require 104 to 125 LCACs, a definite tactical lift shortfall.

The CH-46

The CH-46 has been the workhorse of the airborne ship-to-shore movement. It can carry up to eighteen combat troops at a times. Since it can travel at speeds up to 137 knots, it has the capability to put combat troops on the

beach rapidly. In the conventional assault, one CH-46 can put about 110 troops into combat every hour. With a squadron of CH-46s (about twelve helicopters), this is a significant lift capability. During the over-the-horizon assault though, this capability rapidly diminishes. With the helicopter ships at ranges of approximately fifty miles, one CH-46 is limited to about one load of eighteen troops per hour.

Three other significant issues related to the CH-46 and its lift capacity are its lack of armor, age, and the number available for an assault. The lack of protective armor relegates the CH-46 to a role not requiring forcible entry. The issue of age for the CH-46 is also significant, having been in service for over forty years now. The age of the CH-46 detracts from its performance and creates a safety issue.

An additional factor concerning the participation of the CH-46 (as well as other helicopters) in the amphibious assault is the quantity available for a MEF sized force. Peacetime training exercises usually involve prepositioning troops and supplies ashore, while simulating their flight from the amphibious task force. Additionally, the number of helicopters assigned to a MEF is usually insufficient to land the assault elements and accomplish their mission.[47]

A close look at a two wave (sortie), MEF sized amphibious assault force, will illustrate the difficulties

in air tactical lift. The amphibious shipping has approximately 105 CH-46 operating spots, and sixty-four CH-53 operating spots.[48] Based on the typical MEF sized force, the number of sorties required to lift the assault echelon is 186 for the CH-46 and 378 for the CH-53.[49]

Some optimistic assumptions now become important. Because of the expected operating ranges involved in the OTH assault, it is expected that refueling would be required after each sortie. The next assumption is that the amphibious task force achieves perfect tactical surprise. A third assumption follows from the first and is that there are no losses of helicopters due to enemy fires. The last assumption is that 95% of the helicopters are available on the first sortie, and 92% on the second sortie.[50]

Based on these assumptions, the MEF will have to carry 102 CH-46s and 207 CH-53s.[51] Given this, it will still take over two hours (exceeding the DON Lift Study requirements) to land the assault echelon from a range of fifty nautical miles. And this assumes that five CH-46s can be operated from the same operating spot, and three CH-53s from a heavy operating spot, and that there is no enemy interference or other unscheduled delays.[52] The typical number of CH-46s carried in the MEF is ninety-two, a shortfall of ten, and the typical number of CH-53s is thirty-two, a shortfall of over 170.[53] Of course, the amphibious task force must also operate other helicopters to

provide protection for the CH-46s and CH-53s, as well as AV-8B Harriers. It is clear that this is a serious concern in air tactical lift.

Other Helicopters

The CH-53 helicopter is also available to the landing force, but its primary purpose is to carry combat equipment to the shore. Diversion of this resource to carrying troops will detract from the landing force's ability to accomplish its primary task of securing the beachhead. Additionally, while the CH-53 is not as old as the CH-46, it also suffers from a lack of protective armor.

All other aircraft available to the landing force are too small or just as ill-suited to carry troops in a forcible entry situation. Aircraft outside the landing force as just as poorly suited for amphibious assault, as they were developed for other missions.

Recommendations to Solve Tactical Lift Deficiencies

The airborne lift capability is not a problem without solutions. Indeed, one project is well underway to solving this deficiency. Remembering that the DON Lift study of 1983 called for placement of all troops on the beach within ninety minutes, and the more general requirement to rapidly build up combat power on the beach,

it is clear that a survivable, fast airborne platform with a large lift capacity is desirable.

In the spring of 1981, the U.S. Marine Corps recognized the problem with air lift capabilities, and the resulting loss of capability to conduct its ship-to-shore mission.[54] The U.S. Marine Corps then initiated the MV-22 Osprey program. The MV-22 Osprey is a tilt-rotor aircraft designed to fly twice as fast, lift twice as much, and fly twice as far as the CH-46.[55] The Osprey is also much more survivable.

The Osprey flies at speeds of about 250 knots. This increased speed contributes to the amphibious assault in two ways. First, it directly leads to an increase in rapid buildup of combat power ashore. Furthermore, when combined with its increased lift capacity, it offers the ability to concentrate forces at a critical time and location.[56] Secondly, the increased speed contributes to the Osprey's survivability in two ways. One of the threats to amphibious warfare in the future is the helicopter armed for air-to-air combat. The Osprey's speed will allow it avoid, disengage, and outmaneuver these helicopters.[57] Another major threat to helicopters is ground fire, and the risk grows with increased exposure time. With the Osprey traveling at twice the speed of the CH-46, its exposure time is reduced by half against each individual threat.[58]

A second point in favor of the Osprey is the increased payload capacity. As noted earlier, it can carry twice as much as the CH-46, which allows it to contribute to the requirement for rapid buildup of combat power.

A third capability of the Osprey is its increased range. If the MV-22 Osprey is fully loaded, its combat radius is roughly three times that of the CH-46, or six times that of the CH-46 if they are carrying equal payloads.[59] This contributes to the amphibious assault in three ways, either in allowing the amphibious task force to stand off further from the beach, increasing the depth of penetration of hostile defenses, or permitting the Osprey to make a feint at a location, potentially drawing off the enemy, or his reinforcements, and then proceeding to the actual assault location without having to stop and refuel.[60]

The last feature of note for the Osprey is its survivability. As noted earlier, the increased speed of the aircraft provides some additional survivability. But there are other features as well. The Osprey has some light protective armor built into it. This protective armor, when combined with its other features, significantly contributes to its ability to conduct forcible entry from the air. Some of these other features include a much lower acoustic signature, as little as one-fourth the noise of the CH-46.[61] This permits the MV-22 some measure of surprise, again contributing to its survivability.

The combination of these features allows the Osprey to help solve the MEF heliborne assault dilemma discussed above. A MEF equipped with 186 MV-22s and sixty-six CH-53s could perform the same two wave sortie with only three MV-22s sharing a deck spot and three CH-53s sharing a heavy deck spot. Another point in favor of this use of Ospreys is that the CH-46 and the Osprey use about the same amount of storage space, but since the Osprey is more protected, it does not require as many attack helicopters in support.[62] This combination of aircraft does not solve the lift problem, but it certainly helps. Additionally, this problem only exists for the MEF, while the MEB and MEU size forces can accomplish their lift requirements as far as quantity of aircraft is concerned.

The surface tactical lift also had the problem of not enough LCACs to meet the off-load requirements. One obvious solution is to procure more LCACs. With the current fiscal constraints, this is not a likely solution. Additionally, typical amphibious task force carrying a MEB is already full with LCACs, and has no room for any more, so even if the money was available, it is not the ideal solution.[63]

Perhaps the best solution lies in one of the strategic lift alternatives. Reducing the "footprint" of the MEB or MEF by moving material out of the assault echelon into the follow-on echelon could reduce the number of LCACs

needed to move the assault force. Even if the material could not be moved off the amphibious shipping onto the follow-on shipping, it would not have to be transported with the assault echelon, and could be transported ashore later when LCACs are available.

Communications

Communications are vital in any type of amphibious assault. Combat experience from World War II concluded that every amphibious assault required detailed and redundant communications.[64] There is probably no other military operation that requires such wide use of the electronic spectrum.[65] Coordination between units calling for gunfire support from the beach, aircraft operating between the ships and beach, as well as landing craft approaching the beach need to be in communication to deconflict their actions, otherwise fratricide becomes a real possibility.

Communications in the OTH scenario become much more difficult to achieve. The technical ability to conduct a true OTH assault is a wasted effort if those units are not subject to command and control.[66] While the initial assault may start under silent communications, the requirement for coordination of supporting arms, combat service support, and the landing of follow-on forces requires the ability to establish and maintain reliable ship-to-shore

communications.[67] Jamming by hostile forces could suddenly stop the flow of troops and equipment to the beach.[68]

Several potential communication problems exist in the OTH scenario, including the difficulty of communication between ships and the forces on the beach at OTH distances, jamming, the lack of satellite communication channels, insufficient training in OTH communications and expected OTH difficulties, and insufficient assets for complete coordination.

In general, UHF (Ultra High Frequency) and VHF (Very High Frequency) communications will be limited. Because of the distance between the ships and the beach, aircraft will have to relay messages using UHF and VHF between the two locations. Unfortunately, this will be limited by the number of aircraft available, aircraft that would probably be more efficiently utilized elsewhere.[69] However, UHF and VHF communications would work well, once the amphibious ships start to close the beach.[70]

HF (High Frequency) communications have the capability to reach the beach, but are also limited at the ship and beach.[71] Actual OTH rehearsals relying on HF communications have shown that they work well at times, while at other times they worked intermittently.[72] Additionally, HF communications are also more easily jammed by the enemy.

While satellite communications are certainly possible, it is not expected that an amphibious assault can get satellite channels assigned to the operation. They will generally not be available, since higher headquarters can be expected to use most of the limited number of channels.[73]

Current amphibious doctrine does not adequately address this significant problem, nor is disruption of communications normally practiced on exercises.[74]

> Peacetime safety standards preclude such training. Helicopters form on cue from the helicopter direction center, vector ashore, and receive zone briefs from control agencies ashore. Offshore, boat waves undergo a similar pattern of control. Luckily, the "enemy" makes no attempt to interfere with the massive level of communications needed to orchestrate the attack. While the result is an impressive display of amphibious power, it rests on a fragile base.[75]

Peacetime exercises certainly portray an optimistic scenario.

But peacetime exercises can also show flaws. In Exercise Northern Wedding, conducted in 1986, it was shown that seventy-nine communication nets (HF, UHF, and VHF) were needed to sustain an amphibious assault. The LHA participating in the exercise was able to communicate on fifty-one of those circuits. The LCC, the amphibious ship designed especially for communications, command, and control, was only able to communicate on sixty-nine of them. The remainder of the ships were fortunate to be able to communicate on about a dozen of them.[76] Even if the U.S. was

able to communicate over-the-horizon, it is clear that there are not enough radios available to communicate with.

Numerous other problems plagued the communicators during Northern Wedding. Most of the circuits are not secure, and are therefore susceptible to interception, as well as jamming. The communications systems on all ships but the LHA, (and the LHD, which did not participate) are operated manually, slowing operations. The last problem was the poor state of repair of most of the radios, a problem common to most amphibious ships.[77]

Solutions to the Communications Dilemma

There are a couple of potential solutions to the problems of communication. The first is the assignment of mission orders to units. This will permit them to accomplish the mission and exploit opportunities as they arise. This method also calls for the commanders to be as far forward as possible, instead of on the ships or at remote locations that would require radio communications to keep the commander informed.[78] This would result in the initial assault conducted in conditions fairly resembling radio silence, though radios would still have to be used afterwards.[79]

Another method that can be used to solve the dilemma is using remotely piloted vehicles (RPVs). As noted earlier, aircraft can act as retransmission or relay points,

but there would likely be few aircraft to perform this mission in an amphibious assault. RPVs could be set up to act as relay points. The advantage is that RPVs are cheaper than other aviation assets. Additionally, the passive task of retransmission requiring no operator interface frees personnel to perform other tasks.[80]

A third solution is coming into use right now, the Single Channel Ground and Airborne Radio System (SINCGARS). This equipment is a family of VHF radios that will replace most of the radios now in the Marine Corps. The system can operate both encrypted or unencrypted, and can accommodate both voice and data. It has also a low electronic signature that reduces the chance of being located by the enemy. This low electronic signature will also reduce vulnerability to jamming since use of the SINCGARS will be hard to detect.[81] The SINCGARS would solve the problems of slow operations and secure circuits.

The LX class will also help solve the communication dilemma. It will use the Copernicus satellite communications system, which exceeds the capabilities of any ship currently in the amphibious fleet. The designers of the LX also reserved room so that if another system proves to be better than the Copernicus by the time the LX is introduced, that system will be installed.[82]

Another aspect of communications that needs to be solved is the problem of poor repair. The solution is a

matter of focus, ensuring the radio repair technicians are performing their functions in a timely and correct fashion.

Naval Gun Fire Support

Amphibious doctrine calls for preparation of the landing beach by using massive naval gunfire support to destroy, neutralize, and suppress enemy positions.[83] A MEF-sized assault would ideally require three battleships and eleven destroyers, and the MEB-sized assault would require one battleship and five destroyers.[84] With the decommissioning of the battleships and the sixteen inch guns, many more naval platforms would have to be devoted to the naval gunfire support effort.

The largest gun still available is the 5"/54. There are currently plans to modify these to fire semi-active laser guided projectiles, but even this will only improve the range to about fourteen nautical miles.[85] While it is recognized that the gunfire ships do not have to operate with the amphibious ships, they will have to operate at approximately the same ranges to avoid disclosing the landing sites. This will limit the use of these guns to the time after the initial assaults, when the ships can close and not give up tactical surprise.[86]

Solutions to Naval Gun Fire Support

Four potential solutions are presented for consideration: (1) the use of carrier-based air assets, (2) concentration of attack helicopters in the first wave, (3) the use of ship-based missiles, and (4) the use of LCAC-based missiles.

Because of the lack of range of ship-based guns, the best method currently available to give fire support might be carrier-based aircraft.[87] Carrier-based air could then serve two functions, the first is fire support, and the second, to protect the amphibious shipping. While aircraft would be useful, they still have limitations, the most significant being on-station time. Carrier aircraft have to refuel, and usually must leave the battlefield to do so. Because of this, aircraft are only a partial solution. In a recent White Paper, "From the Sea," it was recognized that carrier-based air would have to support amphibious missions, inglorious as that mission would be.[88]

A refinement and a partial solution is to concentrate the attack helicopters with the initial waves of LCACs.[89] The helicopters could provide close-in fire suppression and antitank fires until the antitank weapons and initial artillery get ashore.[90] Then the attack helicopters can resume their more traditional role of escorting the helicopter assault and deep air-to-surface

strikes. By this time, naval gunfire support ships can close in and start to provide their support.

A third solution to the lack of naval gunfire support is the use of the Multiple Launched Rocket System (MLRS).[91] There are plans to mount a maritime version of the Army's MLRS on ships, restoring the ship's capability to conduct NGFS.[92] The only drawback to this is the range of MLRS is only about thirty kilometers, or about eighteen nautical miles.[93] Ships would still be able to fire from over-the-horizon, but they would not be as far away as they should be. Since the main difficulty with NGFS lies in the initial assault, moving these ships forward might reduce or even eliminate the element of tactical surprise.

Another way to use MLRS is to place them on LCACs. This concept, known as the Shore Bombardment Air Cushion System (SBACS), would have the MLRSs on the LCACs for the initial phase, until the NGFS ships could close in.[94]

There are several advantages to this solution. The technology for this alternative is already available, no further research or development is required.[95] Some other advantages include the maneuverability of the LCAC not only provide defense for the LCAC, but also allows the launcher to be moved quickly for successive missions. The concept would only require a crew of eight, five for the LCAC, and three for the launcher. The LCAC could also be resupplied with ammunition via helicopter.

There are also several problems with this alternative. One of the problems is that only one launcher could be placed on each LCAC. Another problem is if the LCAC loses power, the SBACS role would likely be aborted.[96] A third problem is that the LCAC is diverted from its role of transporting the assault echelon to the beach. As discussed earlier, there aren't enough LCACs to transport the assault echelon as is, taking them away would only exacerbate the problem. A fourth difficulty is if the "footprint" of the MEF or MEB is going to be reduced, this won't help, even though the MLRS launcher presents the same loadout requirements as an AAV.[97]

Mines

One of the biggest threats to amphibious warfare is the use of mines. As noted earlier, mines in the AOA can either delay or abort the assault. Mines in the deep or shallow water are little or no threat to LCACs, but mines on the beach do present a problem to the LCAC. Mines in the shallow will affect either the AAV or the AAAV, but mines on the beach represent little threat to the assault vehicles. Mines on the beach must be cleared because this is where the combat troops and vehicles will be. Fortunately, this is already accomplished by the AAVs and their line clearing charges. These charges clear a path through the beach just

wide enough for troops and vehicles to get through. The problem then is how to handle the offshore mines.

Mine Countermeasures

One of the methods currently in use to reduce the threat of mines in offshore waters is to put an advance party of SEALs (Navy Special Forces) in early enough to clear some of the mines. The problem then is marking the channels that have been cleared. The solution lies in the fairly new technology of the Global Positioning System (GPS). This navigation system can be distributed to the AAVs or AAAVs, who can use this precise navigation system to transit the channel the SEALs have cleared. This method doesn't require the SEALs to clear the entire beach area, but only a narrow channel, since the GPS is accurate to within 10 meters.[98] This will allow the AAVs to proceed up to the beach safely, then clear a lane for the following vehicles and LCACs. Further mine clearance can proceed after the assault echelon is ashore.

Alternatives to Over-the-Horizon Assault

As mentioned in Chapter One, there are some alternatives to over-the-horizon amphibious assault. The first is the underwater amphibious approach. Submersibles have been involved in warfare since the Civil War. During World War II, midget submarines were used by several

countries to attach limpet mines to surface combatants. In 1981, Sweden discovered tracks on the bottom of the sea they suspected belonged to a Soviet submersible capable of crawling along ocean floors.[99] The U.S. Navy currently has swimmer delivery vehicles (SDVs) for delivering SEALs from submarines to shore.[100]

The Underwater Approach

The British are currently developing a submersible landing craft that can carry sixty combat troops and 2.5 tons of equipment from a mothership thirty miles from the shore. The landing craft will submerge to 300 feet and transit to the beach at four knots. Once close in to the beach, a hatch will swing open, acting as ramp for the troops to storm up onto the beach.[101] The use of the underwater approach has the major benefit of achieving tactical surprise, resulting in reduced casualties. The only foreseeable disadvantage to this program would be the cost.

The Remote Approach

History has noted that amphibious assaults traditionally result in high casualties, primarily because they have been based on attrition warfare. The OTH assault technique has attempted to change to maneuver warfare in an attempt to reduce casualties. Another method of reducing

casualties would be to remove combat troops from combat, and that is what the remote approach does.

The Marine Corps is already investigating several advanced autonomous ground robotic combat systems. Application of the same techniques to amphibious assault, the Corps' primary mission, could result in reduced attrition. The Army's Missile Command is currently looking at using unmanned air cushion vehicles, similar to the LCAC, for its missions. These air cushion vehicles are outfitted with missiles, machine guns, and other forms of weaponry. Three of four of these vehicles could certainly lead an amphibious assault, maneuvered by operators a safe distance away in their own LCACs. They would soften the beach defenses, and then provide covering fire for the manned assault waves.[102] As in the previous alternative, the primary disadvantage now seen is the cost of developing these systems.

Wing-in-Ground Effect

Another futuristic vehicle that might provide another method of amphibious assault is the Force Projection Vehicle (FPV). The FPV is a water-based airfoil, with a wingspan of 420 feet and 230 feet long. It generates its speed and lift by a combination of ground effect and downward projecting wingtips that confine the rushing air, creating a cushion of air. It has a maximum range of 5,750

nautical miles, and a cruising speed of 125 knots. At its destination of the beach, it can reach its maximum velocity of 260 knots, while carrying a payload of 520 tons. Considering that one tank weighs about sixty tons, the advantage of a vehicle such as this is clear.[103]

Flying several vehicles such as these in combination with a seaborne assault from an amphibious task force, could provide a potent combat force. Operational surprise could be achieved by use of the FPVs alone, and may be achievable even with a combination of FPVs and an amphibious task force. This would still achieve tactical surprise, and would provide an extremely rapid build up of combat power, landing an assault echelon in one wave. The disadvantage to this program is the limitation on what size forces could be assaulted. While FPVs probably couldn't stand up to a heavily opposed landing, a lightly opposed one is certainly feasible.[104]

The Compressed Time Line

Another method of conducting an amphibious assault is a method dubbed "the compressed time line." This method is essentially a conventional assault with OTH technology. In this method, the amphibious ships move close into the beach, as in a conventional assault. They don't move in though, until a few hours before the assault. The ships conduct a few hours of naval gunfire support to suppress the

defenses, and then send the assault waves in. The assault waves in this method consist of helicopters, LCACs, conventional landing craft, and AAVs. The AAVs are able to be used since this assault is conducted from conventional distances. Following the AAVs are the LCACs carrying their loads, and the conventional landing craft, carrying the larger loads. Simultaneously, the helicopters are flying in to drop off their troops.[105]

The essential idea behind this concept is the extremely rapid build up of combat power since the shipping is closer to the beach, reducing the turn around times. Additionally, the conventional landing craft with their larger payloads can help bring more to the beach. With a large amount of combat power arriving on the beach at the same time, it is hoped that the enemy will be overwhelmed, allowing a beachhead to be established.[106]

This concept is strengthened more by the use of AAAVs and Ospreys. The more speed, the more rapid the build up of combat power, the more successful the assault. The major problem with this concept is the turn around times. Moving the shipping in closer to the beach will certainly make the turn around times faster, assuming the risk of moving the ships in close is accepted. The problem with the turn around times lies in the loading of the landing craft on the ships. With each LCU that has to be reloaded, the loading time in the ship is approximately one hour. Each

LCAC will require approximately thirty-seven minutes.[107] It is easy to see that more time is spent loading in the ship than spent in transit. This concept might be better if some way could be found to reduce these loading times as well.

Summary

Judgement is not the goal of this thesis with respect to these alternatives to OTH assaults. However, awareness by the reader might provide good ideas in how to conduct warfare better, with smaller loss of lives.

This chapter has looked at the technology and equipment either currently available or in the research and development stages which can contribute to an over-the-horizon amphibious assault.

The AAAV which will provide forcible entry and an element of surprise to the assault allows the amphibious task force to remain over twelve miles distant from the beach.

The MV-22 will also support the OTH assault. By replacing the aging CH-46 helicopter it increases the lift capacity and buildup of combat power ashore, meeting the requirements of the DON Lift Study.

The LX class ship will allow an amphibious task force to carry more LCACs to perform the assigned mission. It will also provide, in concert with SINCGARS, a

communications suite, which along adaptation of RPVs to provide over-the-horizon relay capabilities, would meet the communication requirements for the OTH assault.

Carriers are also deploying concurrently with amphibious task forces, providing the capability of carrier-based air should the need arise. This, along with development of a maritime equivalent of MLRS will provide a reasonable substitute for the loss of naval gun fire support, helping to increase survivability and achieve mission accomplishment. This combination of new equipment and technology provides better protection to the task force from coastal obstacles, modern weapon systems which could destroy contemporary amphibious operations, and greater felexibility to assault almost any beach.

Chapter Four will now provide recommended combinations of equipment and technology for a successful amphibious operation using OTH. It will provide some specific author opinions and recommendations for further research.

CHAPTER FOUR

CONCLUSIONS

Facts provided by this thesis have identified the need for the over-the-horizon amphibious assault. The use of current technology, obstacles, and the proliferation of modern technology and weapons have developed the potential for creating a killing field, making conventional assault methods no longer feasible, except in the most benign situations. Conventional amphibious operations generally cannot survive in most geographical theaters. A change in amphibious operations doctrine is necessary and there is a solution, over-the-horizon amphibious assault.

Based on these facts, and the evidence presented in Chapter Three, the OTH assault capability is not only feasible, but required. The U.S. military must plan on a worst case basis, and the OTH assault is needed to counter the worst case. Conventional methods against worst case scenario could result in disastrous loss of men and material.

While doctrine for the over-the-horizon assault has not been formalized, tactics, techniques, and procedures are already in use. Doctrine writers have envisioned the procedures for OTH assault, and are exercising and refining

those procedures. Equipment and technology, such as the Osprey, AAAV, and communications gear, are being developed to support the future doctrine, and as demonstrated in Chapter Three, this development continues.

Budget constraints remain a concern. If the equipment and technology needed to support an OTH assault is not provided, the U.S. may not be able to perform the OTH assault. This means the U.S. will be presented the choice of not meeting a portion of its national security requirements.

Force Structure

The force structure for the OTH assault should consist of the appropriate number of ships (depending on the size of the Marine force) to include LHDs, LHAs, LSDs, and LXs for the force projection required in the theater. The use of AAAVs, MV-22s, and LCACs will provide access to the beach from a long distance with some protection. The continued use of SINCGARS, GPS, adaptation of RPVs, and carrier-based air, will help to solve the command and control problems, and will increase fire support until ships can move closer to the shore or artilery is established ashore.

Areas for Further Research

Several areas for further research remain. The alternatives to the OTH assault, specifically the underwater, remote, and wing-in-ground effect approaches have merit to them. Since each one of these methods appears to be fairly costly, good studies on their effectiveness and cost-benefit would certainly be welcomed in today's fiscally constrained environment.

Some additional areas for research include over-the-horizon communications. Placing the commander forward is not always the best solution. It will ease communications ashore, but the commander generally has troops ashore and on ship, and sometimes it is best if the commander is on a ship, where he has better coordination facilities.

Another area demanding research is anti-mine warfare, or mine countermeasures. This problem was brought to the forefront by Operation Desert Storm, and no ideal solution has been found. Research in this area concentrates on how to deal with the mines once they are found, rather than on how to find the mines. One rather exotic ideas being worked on right now uses dolphins to search for mines. In any case, this area is ripe for study.

Naval Gunfire Support is another area requiring further research. Not necessarily the best method to conduct naval gunfire support, but perhaps if it is even

needed. The tradeoff between destruction of beach defenses and the loss of tactical surprise is the key to this area.

Other areas include a study of how to optimize the use of AAAvs and the Osprey. Another question to answer is should LCUs be retained for use in assaults? Another key question, is what is the threat that amphibious assaults will have to be focused on?

In summary, there are still many areas to be researched. This thesis cannot be considered a complete look at OTH assault, but it does provide a point of departure. Though the future is uncertain, one of the things that has remained constant throughout history is that there is almost always a conflict occurring somewhere in the world, and the U.S. must be ready to meet whatever challenge is presented.

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APPENDIX A

GLOSSARY

Amphibious Assault: The principle type of amphibious operation which involves establishing a force on a hostile shore.

Amphibious Force: A naval force and landing force, together with supporting forces that are trained, organized, and equipped for amphibious operations.

Amphibious Operating Area (AOA): A geographical area, delineated in the initiating directive, for purposes of command and control within which is located the objective(s) to be secured by the amphibious task force. This area must be of sufficient size to ensure accomplishment of the amphibious task force's mission and must provide sufficient area for conducting necessary sea, air, and land operations.

Amphibious Operation: An attack from the sea by naval and landing forces, embarked in ships or craft involving a landing on a hostile shore.

Amphibious Vehicle: A wheeled or tracked vehicle capable of operating on both land and water.

Boat Lane: A lane for amphibious assault landing craft, which extends seaward from the landing beaches to the

line of departure. The width of the boat lane is determined by the length of the corresponding beach.

Departure Point: A(n) (air) control point at the seaward end of the (helicopter) approach lane system from which (helicopter) waves are dispatched along the selected approach lane to the initial point.

Fire Support Area (FSA): An appropriate maneuver area assigned to fire support ships from which to deliver gunfire support of an amphibious operation.

H-Hour: The clock time of the first touchdown of landing craft and aircraft in the ship-to-shore movement of an amphibious operation.

Landing Beach: That portion of a shoreline usually required for the landing of a battalion landing team. However, it may also be that portion of a shoreline constituting a tactical locality (such as the shore of a bay) over which a force larger or smaller than a battalion landing team may be landed.

Landing Craft: A craft employed in amphibious operations specifically designed for carrying troops and equipment and for beaching, unloading, and retracting.

Landing Zone: Any specifies zone used for the landing of aircraft.

Landing Site: A continuous segment of coastline over which troops, equipment, and supplies can be landed by surface means.

Line of Departure: A suitably marked offshore coordinating line to assist assault craft to land on designated beaches at scheduled times.

Marine Expeditionary Unit: The Marine Expeditionary Unit is a task organization which is normally built around a battalion landing team, reinforced helicopter squadron, and logistics support unit. It fulfills routine forward afloat deployment requirements, provides an immediate reaction capability for crisis situations, and is capable of relatively limited combat operations.

Primary Control Officer (PCO): The officer embarked in a Primary Control Ship assigned to control the movement of landing craft, amphibious vehicles, and landing ships to and from a colored beach.

Primary Control Ship (PCS): The ship assigned to control the movement of landing craft, amphibious vehicles, and landing ships to and from a colored beach.

Descriptions

The following is a set of descriptions of personnel, and equipment. It is provided to give more detail to personnel and equipment involved in both conventional and over-the-horizon assaults.

Personnel

Personnel for assault operations are normally provided by the U.S. Navy and U.S. Marine Corps. The U.S. Navy essentially provides personnel in four different areas. These four areas are the personnel who man the ships, the personnel who man the landing craft, the beachmasters, and the special forces personnel. First, and most obvious, they provide the personnel who man the ships and control the landing craft for the amphibious assault. Most personnel onboard these ships are general fleet sailors, trained to sail on any ship. There is a cadre of personnel onboard who have training in amphibious operations, however.

Secondly, the U.S. Navy provides the personnel who operate the landing craft between the ships and the shore. These personnel have significant training in the use of landing craft. Personnel assigned to these craft are generally onboard them for at least two years, their sole function is to maintain the landing craft for use in war.

The third group of personnel are the beachmasters. These are the people who ensure the assault troops and equipment get off the landing craft and onto the shore. Beachmasters are specially trained to guide the landing craft through the surf zone and to land safely on the beach. They also have training in salvage procedures and traffic control.

The last group of personnel are the special forces personnel who generally precede the assault. They are responsible for clearing the beach of obstacles, conducting reconnaissance, and providing initial terminal guidance for the first landing craft. Terminal guidance is the process of directing the landing craft into the beach to its landing location.

The USMC provides the assault troops, the personnel who operate the helicopters, and the personnel who remain on the ship to coordinate the assault with the USN personnel. The assault forces from the U.S. Marine Corps can be found in three different sizes: the Marine Expeditionary Unit (MEU/approximately 2000 troops), the Marine Expeditionary Brigade (MEB/approximately 15,700 troops), and the Marine Expeditionary Force (MEF/approximately 52,300 troops).

Each of these combat assault organizations consists of these elements; ground combat, air combat, and combat service support. This makes each organization entirely self-contained and self-supporting. Each of these organizations is also tailored in size to meet the expected threat. The MEU is the smallest unit, containing approximately two thousand personnel. The ground combat element is a battalion-sized unit and is called a Battalion Landing Team (BLT). The air combat element consists mostly of helicopters (about twenty three helicopters). Fixed wing assets, such as AV-8B Harriers, may also be assigned. The

combat service support element has enough supplies to permit the MEU to sustain combat operations for fifteen days. It usually requires five amphibious ships to carry a MEU. The types of ships which transport the MEU is usually a mix of one LHD/LHA/LPH, one LPD, one LSD, one LKA, and one LST.

The ground combat element of the MEB is a regimental-sized unit (15,700 troops), called a Regimental Landing Team (RLT). The air combat element consists of both helicopters and fixed wing assets (usually 104 helicopter and forty V/STOL fixed wing aircraft). The combat service support element has enough supplies to sustain combat operations for thirty days. It takes between fourteen and eighteen amphibious ships to carry a MEB.

The MEF contains approximately 50,600 personnel. The ground combat element is of division size. The air combat element contains substantial (162 helicopter and 60 V/STOL fixed wing) air assets. The combat service support element provides enough supplies to sustain combat operations for sixty days. It requires between fifty and sixty amphibious ships to carry a MEF.

In addition to the assault forces, other Marine Corps personnel are involved in amphibious operations. Marine Corps personnel operate the helicopters and fixed wing assets that carry troops in and provide combat air support to the ground battle. Additionally, there is a

contingent of Marine Corps personnel who remain onboard the ships to coordinate the off-load of personnel and supplies.

Equipment

The Navy and Marine Corps have a variety of ships, aircraft, and equipment to train, transport, and conduct amphibious operations. The U.S. Navy has several types of amphibious ships. These are the multi-purpose amphibious assault ship (LHD), the general purpose amphibious assault ship (LHA), the amphibious assault ship (LPH), the amphibious cargo ship (LKA), the amphibious transport dock (LPD), the dock landing ship (LSD), and the tank landing ship (LST).

The largest of these is the LHD. This ship has the capability to operate helicopters, Vertical/Short Take-Off Landing (VSTOL) aircraft and all types of landing craft. It carries 1873 troops, and up to forty-two CH-46 helicopters, or twenty AV-8B Harriers. A normal deployment package consists of four LCACs, about twenty helicopters, and four VSTOL. The maximum speed of the LHD is twenty-three knots. There is only one LHD in service now. Four more in production and are scheduled to be in service in 1995.

The next largest ship is the LHA. It is essentially a slightly smaller LHD, with the capability to operate helicopters, VSTOL aircraft, and all types of landing craft. It carries 1703 troops, up to twenty-six CH-46 helicopters,

or six AV-8B Harriers. A normal deployment package consists of two LCUs, 3 LCM-8s, and approximately 24 helicopters. The LHA has a maximum speed of twenty-four knots, and there are currently five of this class in commission. No more are scheduled to be built.

The next ship class is the LPH. It has the capability to operate helicopters, and VSTOL aircraft, but cannot operate landing craft. It carries 1746 troops, up to twenty CH-46 helicopters, or four AV-8B Harriers. It has a maximum speed of twenty-three knots. There are currently seven LPH's in commission, but they are all due to be replaced by the LHDs in the year 2000.

The fourth type of ship is the LKA. It does not carry any helicopters, fixed wing aircraft, or assault landing craft. However it can operate helicopters and serve as a cargo ship with the capability of transferring goods ashore once the beach has been secured. These ships hold only 362 troops and has a maximum speed of twenty knots. There are three in commission, and zero in production.

The LPD has the capability to operate two helicopters at any one time and can use all types of landing craft. It can carry 840 troops and has a maximum speed of twenty one knots. There are twelve of these ships in commission, but all are planned to be decommissioned and replaced by the LHDs in the year 2001.

The LSD also has the capability to operate two helicopters and all types of landing craft, though it is the primary platform for the air-cushioned landing craft (LCAC). These are described later in the landing craft descriptions. The LSD can carry 450 troops and four LCACs. There is a cargo variant of this class that can operate only two LCACs instead of the usual four. This class has an extra 27,500 cubic feet of cargo storage. The LSD has a maximum speed of twenty-two knots. There are eight LSDs in commission and five under construction scheduled to be in service in 1996.

The next class is the LST. The LST does not carry assault helicopters or landing craft, but it does carry amphibious assault vehicles (AAV). These are described later in the landing craft descriptions. It carries four hundred troops and has a maximum speed of twenty knots, There are currently eighteen in commission, but all are to be decommissioned before the year 2001.

Landing Craft

The primary means to disembark personnel, cargo and supplies from ships is by landing craft. There are three types of landing craft still in use, the mechanized landing craft (LCM-8), the utility landing craft (LCU), and the air cushioned landing craft (LCAC).

The smallest landing craft is the LCM-8. This conventional landing craft has the capability of carrying

one main battle tank or two hundred troops. Its maximum speed is nine knots.

The second type of landing craft is the LCU. At eleven knots maximum speed, it is capable of carrying three tanks or 350 troops. Both the LCU and the LCM-8 are displacement craft, that is, they drive through the water.

The last type of landing craft is the LCAC. This is a non-displacement craft. That is, it operates on the water, using a cushion of air between it and the water to reduce the drag of the water. It has a maximum speed of seventy knots unloaded, and forty knots loaded. It can carry one tank, but currently has no capability to carry passengers.

The next piece of equipment is the amphibious assault vehicle. The AAV is an armored vehicle that drives through the water onto the beach, and then continues the fight on land. It has a maximum speed of six knots. Its major limitation is that it can only travel forty five hundred yards in the water before it must land.

Aircraft

The next set of equipment to be discussed is air assets, rotary wing (helicopters) and fixed wing. The helicopter used most in amphibious assaults is the CH-46 Sea Knight. This helicopter has no armor, a maximum speed of 137 knots. It carries up to eighteen troops, and has no weapons of its own.

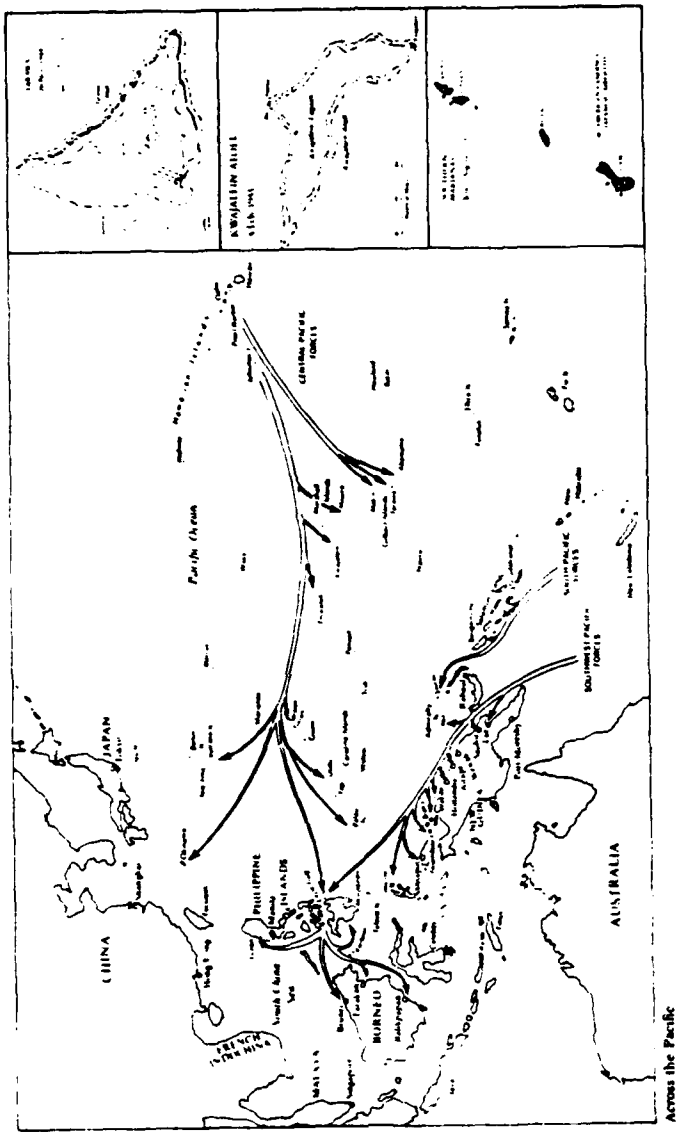
The next helicopter is the CH-53 Sea Stallion. This is the heavy lift helicopter for the amphibious assault. It has no armor, and has a maximum speed of 150 knots. It can carry up to thirty eight troops, and can carry up to three small caliber machine guns.

The next helicopter is the UH-1 Huey. This helicopter does not have any armor, and has a maximum speed of 110 knots. It is generally used for command and control of forces, but it can carry up to sixteen troops, and can carry one small caliber machine gun.

The last helicopter is the AH-1 Sea Cobra. This helicopter is also without armor, and has a maximum speed of 128 knots. Its purpose is to provide close combat support to the ground. It can carry small cannons, machine guns, grenade launchers, and various missiles, but has no lift capacity.

The next aircraft is the only fixed wing asset that can operate from amphibious shipping, and that is the AV-8B Sea Harrier. It provides close air support to the combat forces on the ground. It can travel at a maximum speed of 575 knots and has no lift capability.

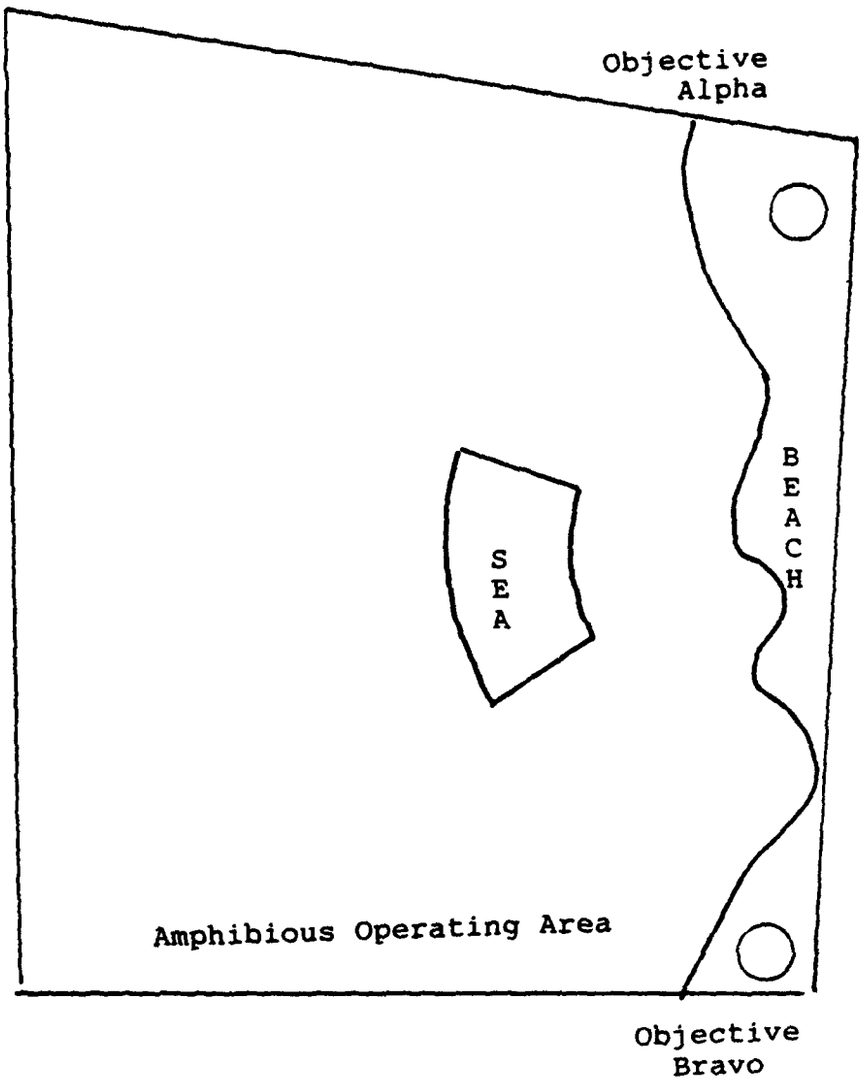
APPENDIX B



Island Hopping

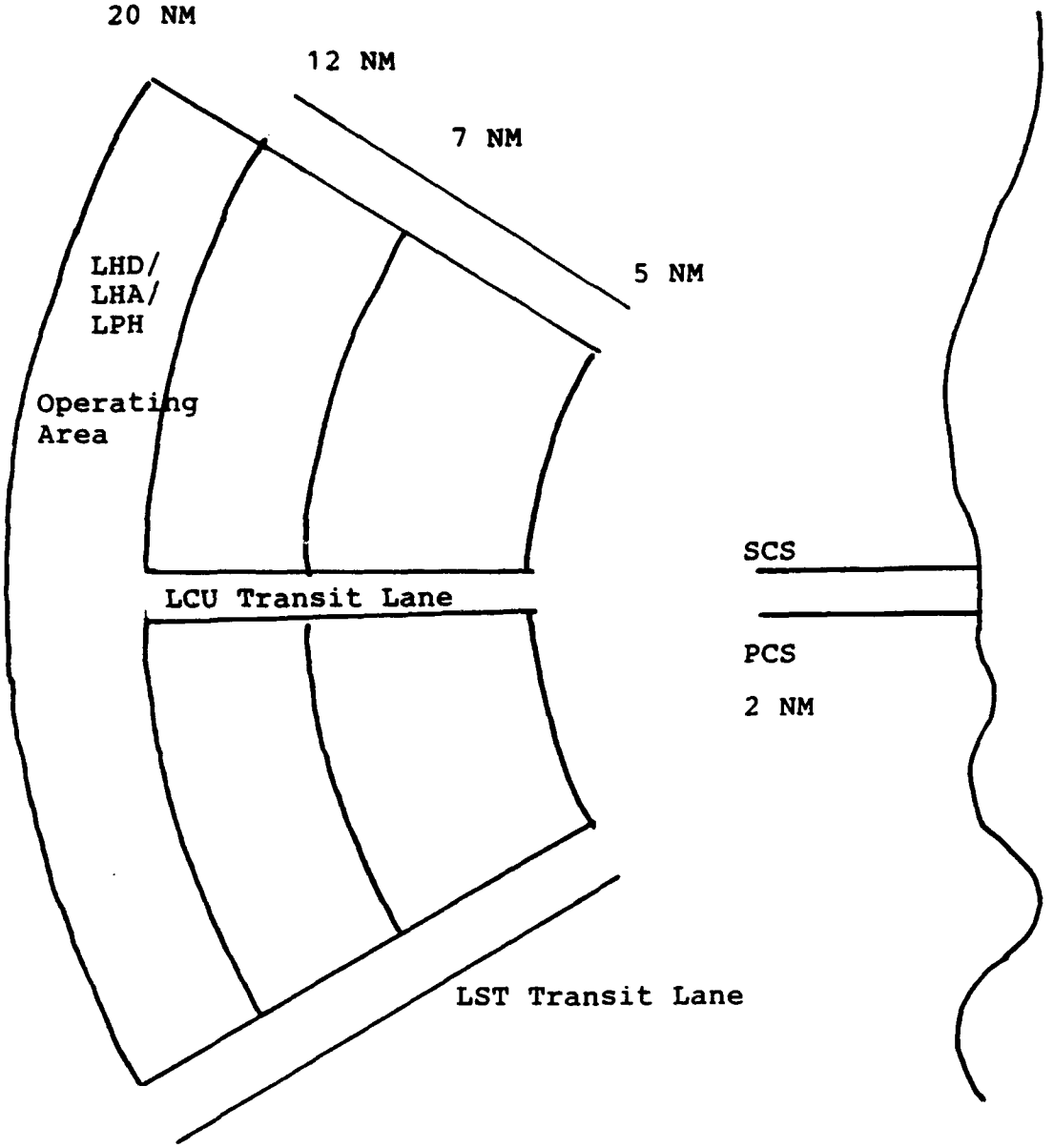
From SEA POWER: A NAVAL HISTORY, E.B. Potter, p. 320

Figure One



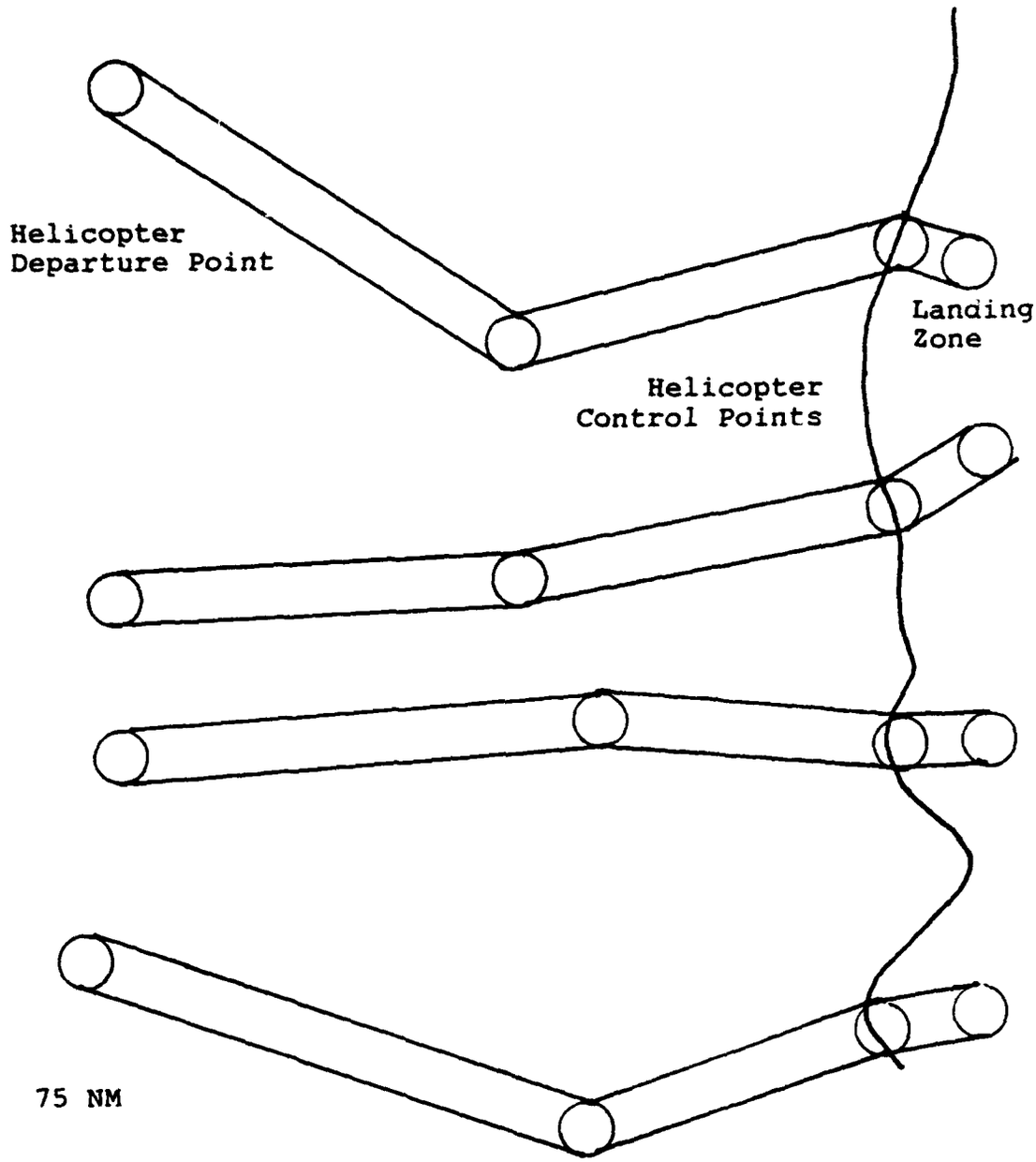
Amphibious Operating Area

Figure Two



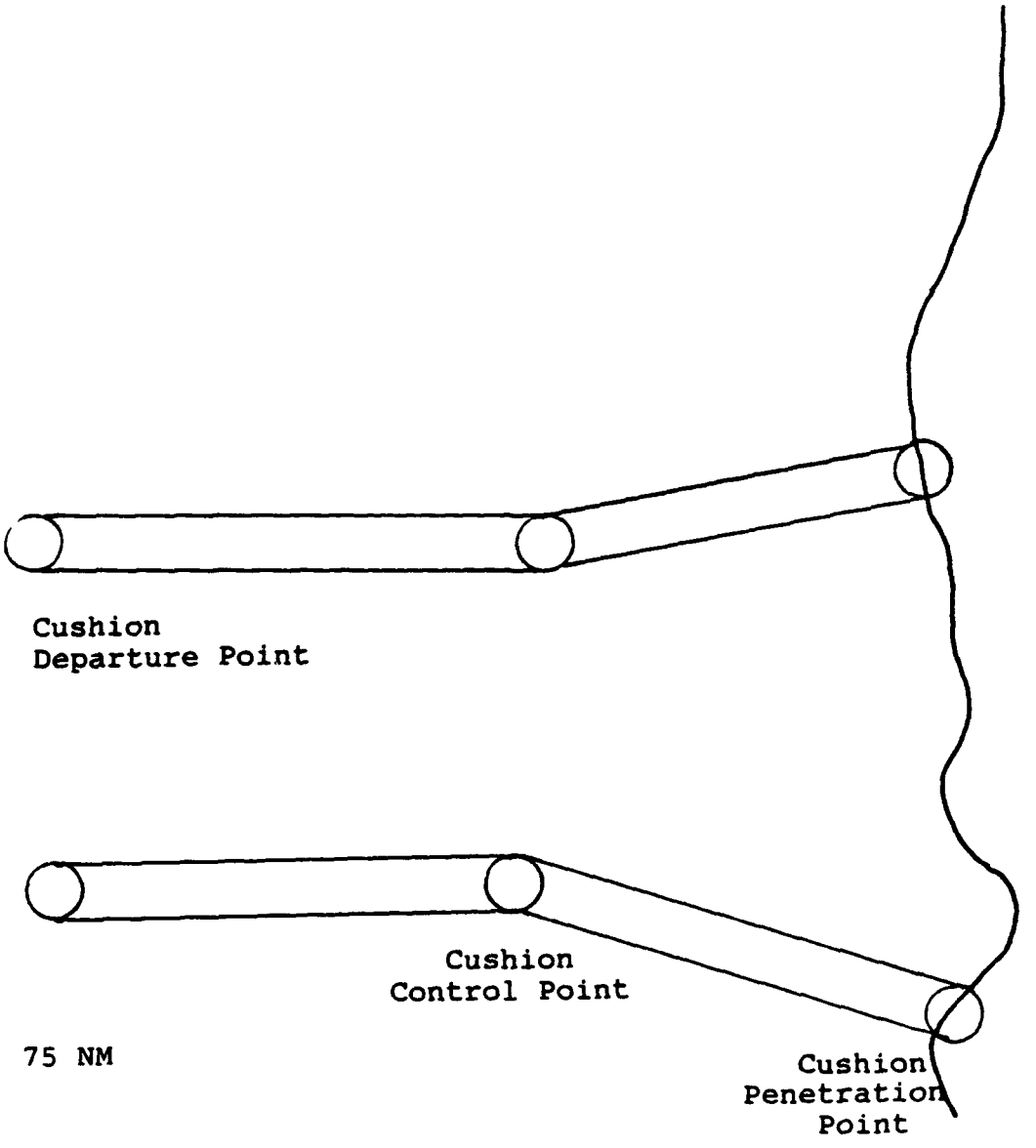
Boat Lane Diagram

Figure Three



Helicopter Assault Diagram

Figure Four



LCAC Assault Diagram

Figure Five

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